BUSINESS PLAN FOR CREATION OF THE INNOVATIVE COMPLEX FOR PRODUCTION OF BIOPLASTICS

CONTENT

1. PROJECT SUMMARY

Project concept	**The Project provides for the creation of an integral innovative complex for the production of biopolymer based on the innovative technology with a controlled period of biological destruction and the subsequent sale of the finished products in Ukraine, Europe and the East.**	
Location	**Ukraine, Ternopil region, Borshchivsky district, town of Borshchiv**	
Project implementation schedule	**Project period**	**6 years (72 months)**
	Time required for the Project implementation	**13 months**
	Production start date	**February 2021**
Project budget	**Project cost**	**$17 643 932**
	Own funds	**$2 000 000**
	Investment funds (on a repayable basis)	**$15 643 932**
	Autonomy ratio	**11%**
Project profitability	**Gross income**	**$296 009 399**
	Capitalized net income	**$95 713 137**
	Total cash flow	**$84 277 605**
Investment attractiveness of the Project	**Discount rate**	**18,0%**
	Payback period (term) - PP, years	**2 years 6 months**
	Payback period (term) of the Project from the start of production, years	**1 year 6 months**
	Discount payback period - DPP, years	**2 years 9 months**
	Discount payback period from the start of production, years	**1 year 9 months**
	Net Present Value of the Project - NPV	**$41 751 880**
	Internal rate of return - IRR	**85,4%**
	Profitability index - PI	**3,56**

2. PROJECT DESCRIPTION

Polymer waste is one of the main problems of the 21st century.

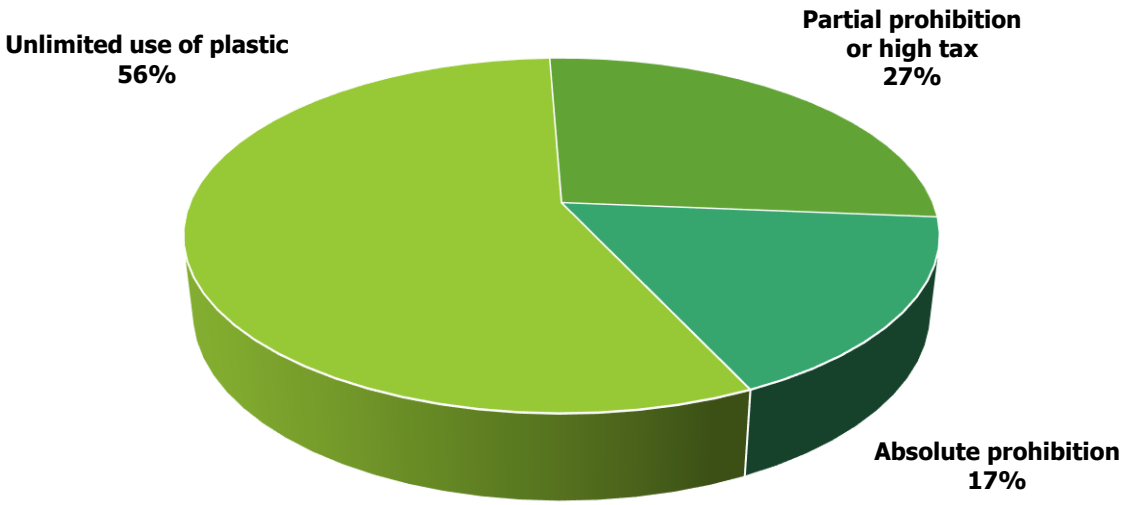
Every Ukrainian uses about 500 plastic bags annually. Moreover, according to statistics, the average duration of the use of such a package is **12 minutes**, at that such a package decomposes up to 200 years or **105,120,000 minutes**.

Up to 11 million tons of household waste is generated annually in the country, the share of various polymers is 30%. At that, just over 1% of the plastic has ever been recycled for reuse.

At the end of 2019, Ukraine adopted in the first reading the draft Law on Limiting the Turnover of Plastic Bags in Ukraine No. 2051-1 dated 18.09.2019, which is the first step towards limiting the use of oil-based plastics in our country.

However, in modern conditions, a complete rejection of plastic is almost impossible. Only about 44% of 197 countries around the world have restrictions on the use of plastic:

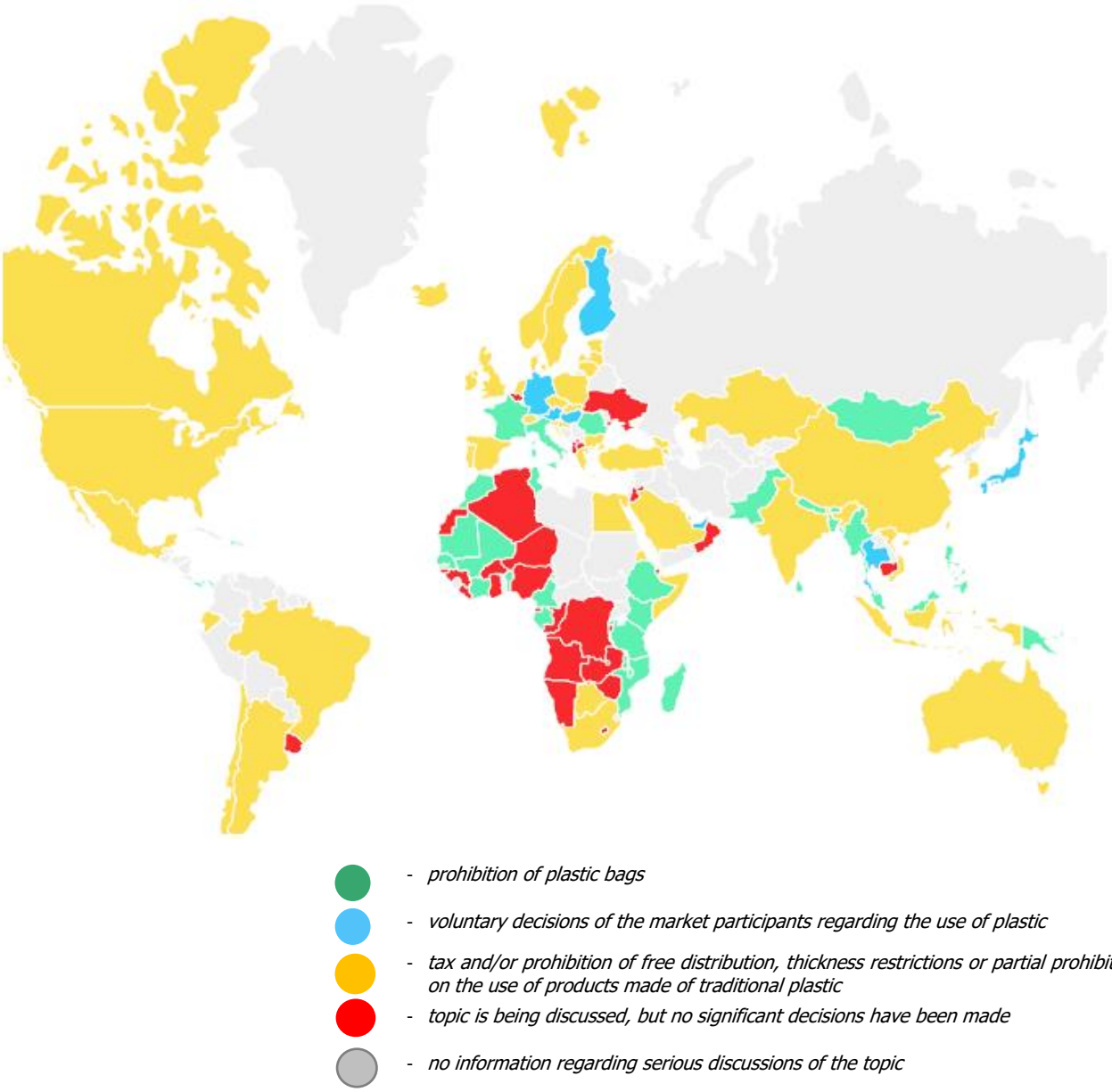
Fig 1. Relation of the countries of the world to the use of plastic.



The only alternative to "oil" plastic is the use of biopolymers, which makes it possible to produce goods with the same physical and mechanical properties, but at the same time dissolve in carbon dioxide, water, and mineralized salt in a much shorter period of time.

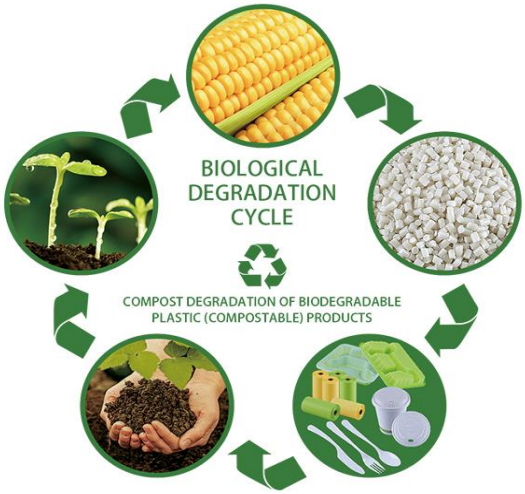
So, the implementation of the Project forms a new concept of handling plastic in Ukraine: **NOT A PROHIBITION** of the use of plastic, which has become part of our everyday life, but its replacement with **BIOPLASTIC** - an innovative, environmentally friendly and practical type of material for the production of most types of "plastic" products.

Fig. 2. Countries of the world (by the level of restrictions on the use of plastics in circulation)



The concept of the project provides for the industrial processing of corn into a 100% biodegradable biopolymer using a unique technology of triple nanopolymerization, which makes it possible to obtain a biocompound (or bioplastic) with high physical and mechanical properties.

Biopolymer is a plastic that dissolves under natural conditions, at that biodegradation time of the biopolymer depends on the degree of starch copolymerization.



Purpose and tasks of the Project

The purpose of this Project is the production of a biopolymer with a controlled period of biological destruction using the production complex, the creation of which is planned by the Project, and obtaining a product with high properties and at a lower price.

Main tasks of the Project implementation:

- Development of design and technological documentation for the industrial production of bioplastics for its further use as a substitute for traditional polymers for the production of various types of products.

- Performance of design and installation work related to the installation of the necessary production equipment to ensure the production of the declared range of products

- Formation of sales channels for the products in Ukraine, European countries, the East.

- Formation of a professional research and production team

- Active advertising and promotion of biopolymers as a substitute for traditional oil-based polymers
- Development of advanced production techniques and use of bioplastics in modern production
- Expansion in the future of the assortment and production volumes, taking into account market needs
- Obtaining planned financial indicators

Business Plan Goals

This business plan provides a justification for the effectiveness of investment in the creation of a modern high-tech biopolymers manufacturing plant.

Fig 3. Business Plan Goals

Justification of economic efficiency and feasibility of biopolymer production

Justification of profitability of the selected type of activity - biopolymers manufacture for the use in industrial production of plastic products

Definition of market conditions and forecast of biopolymers sales

Assessment of the expected financial results of the business and building a financial strategy

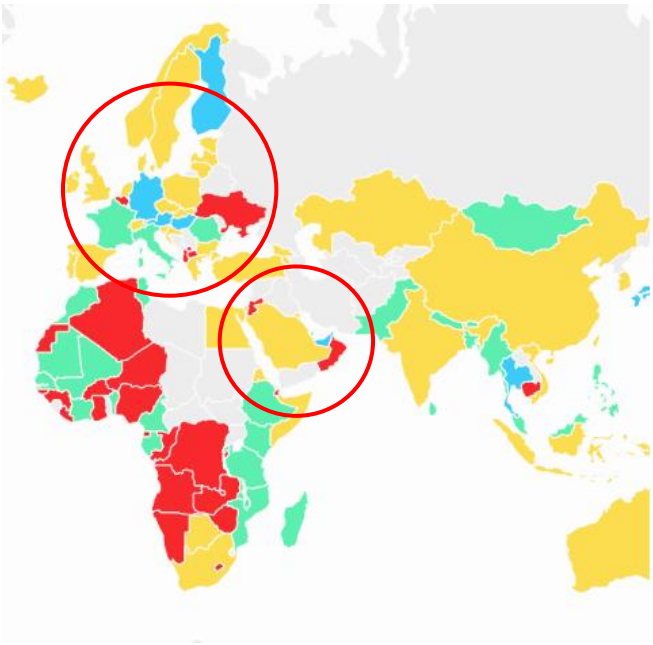
Implementation of the Project will allow:

✓ to create a biopolymers manufacturing plant for the production of plastic products based on advanced technologies;

✓ to solve partially the global problem of the land, forests and water areas pollution with polymer waste;

- ✓ to satisfy consumer demand for high quality bio products;
- ✓ to form a stable customer base;
- ✓ to increase the income and profit of the enterprise;
- ✓ to increase the market value of the enterprise;
- ✓ to lay the prospect of the production expanding in Ukraine and Eastern Europe.

Fig 4. Countries, in which distribution of the industrial complex products is planned.



- *plastic bags are prohibited*
- *voluntary decisions of the market participants regarding the use of plastic*
- *tax and/or prohibition of free distribution, thickness restrictions or partial prohibition on the use of products made of traditional plastic*
- *topic is being discussed, and no significant decisions have been made*
- *no information regarding serious discussions of the topic*
- *target markets for the products*

Main parameters taken for the Project calculations:

Calculation period of the Project	Currency of indicators calculations	Sales start day
6 years	**US dollar**	**February 2022 year**

3. PRODUCTION PLAN

3.1. Location of the Project implementation object

The Project supposes organization of the biopolymers innovative manufacturing plant for the industrial production of plastic products.

According to the chosen project implementation strategy, it is planned to acquire a sugar, starch plant or other plant with the similar type of activity that is in the stage of cessation of main production or one that has stopped production. The choice stemmed from the fact that similar objects have necessary infrastructure facilities for the organization of production of biopolymers, in particular:

- industrial, non-production and ancillary premises, which are not beyond repair and modernization during the process of creating of biopolymers production;
- gas pipeline networks with network connection;
- internal water supply network;
- electricity network with connection to networks;
- a system of settling ponds that can be used for wastewater treatment;
- sewerage system.

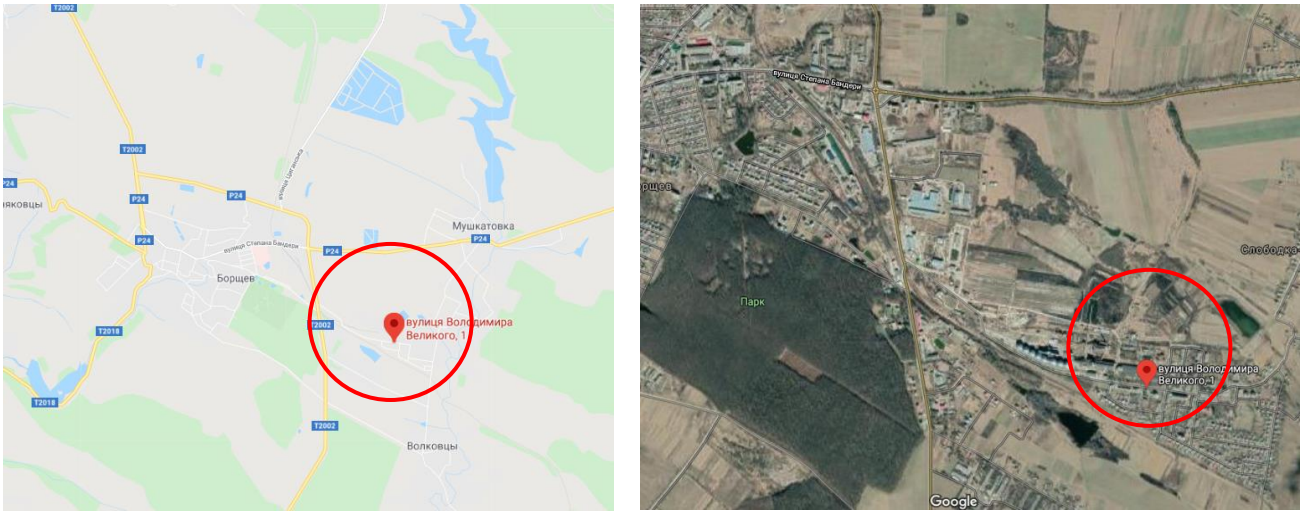
During the project implementation, it is planned to repair the existing premises and to re-equip them in order to create a modern production complex equipped with modern equipment with the using of automated production process control systems.

The location of this innovative production, which is on the territory of Borshchiv Sugar Plant in Borshchiv in the Ternopil region, is optionally considered.

Fig. 5. Project location

The area of the land plot, which is about 54 hectares, is enough to accommodate all the planned objects for the project. At the same time, this plant has a sufficient number of infrastructure elements, which are necessary for the organization of innovative production of bioplastics.

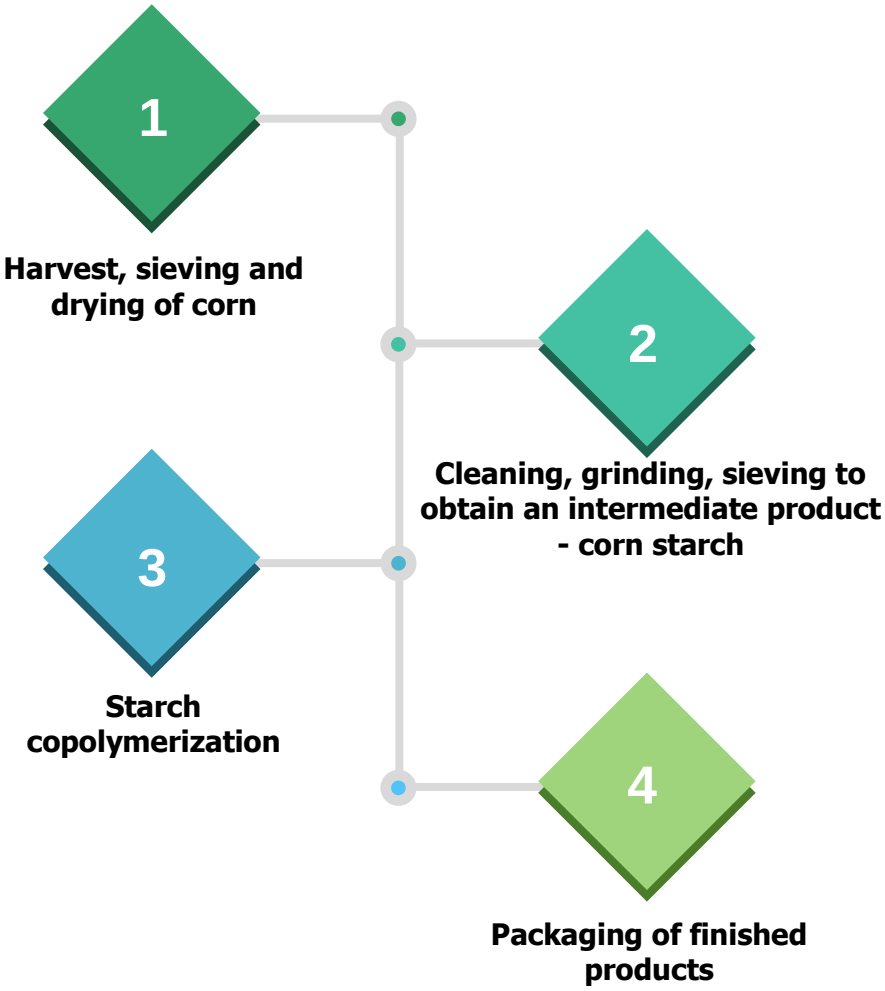
Fig. 6. Borshchiv sugar plant, town of Borshchiv, Ternopil region.



3.2. Description of production process

The biopolymer production technology is based on the many years of experience of the project initiators. Polymer production technologies are developed on the basis of modern scientific research, using the latest equipment based on full automation of the production processes in order to achieve high quality indicators of the finished products.

Basic technological production processes are environmentally friendly, technically simple using standard technological equipment after minor technical modifications. An important aspect of the production is the creation of an automated production process control system for achievement of the maximum level of the finished products quality.



The main feature of the general technological process for the biopolymers production is the use of our own unique technologies of initial components and unique technological parameters of the production process (humidity, temperature, concentration, processing time, etc.).

Each stage of the technological process is controlled separately in order to produce high quality products. It is worth noting that intermediate products of each stage, if necessary, can act as a separate type of product, that is, in the event of a change in market conditions, the enterprise can produce not only the main list of products, but also can provide elevator services or sell raw starch.

The structure of the main, intermediate and related products is presented below.

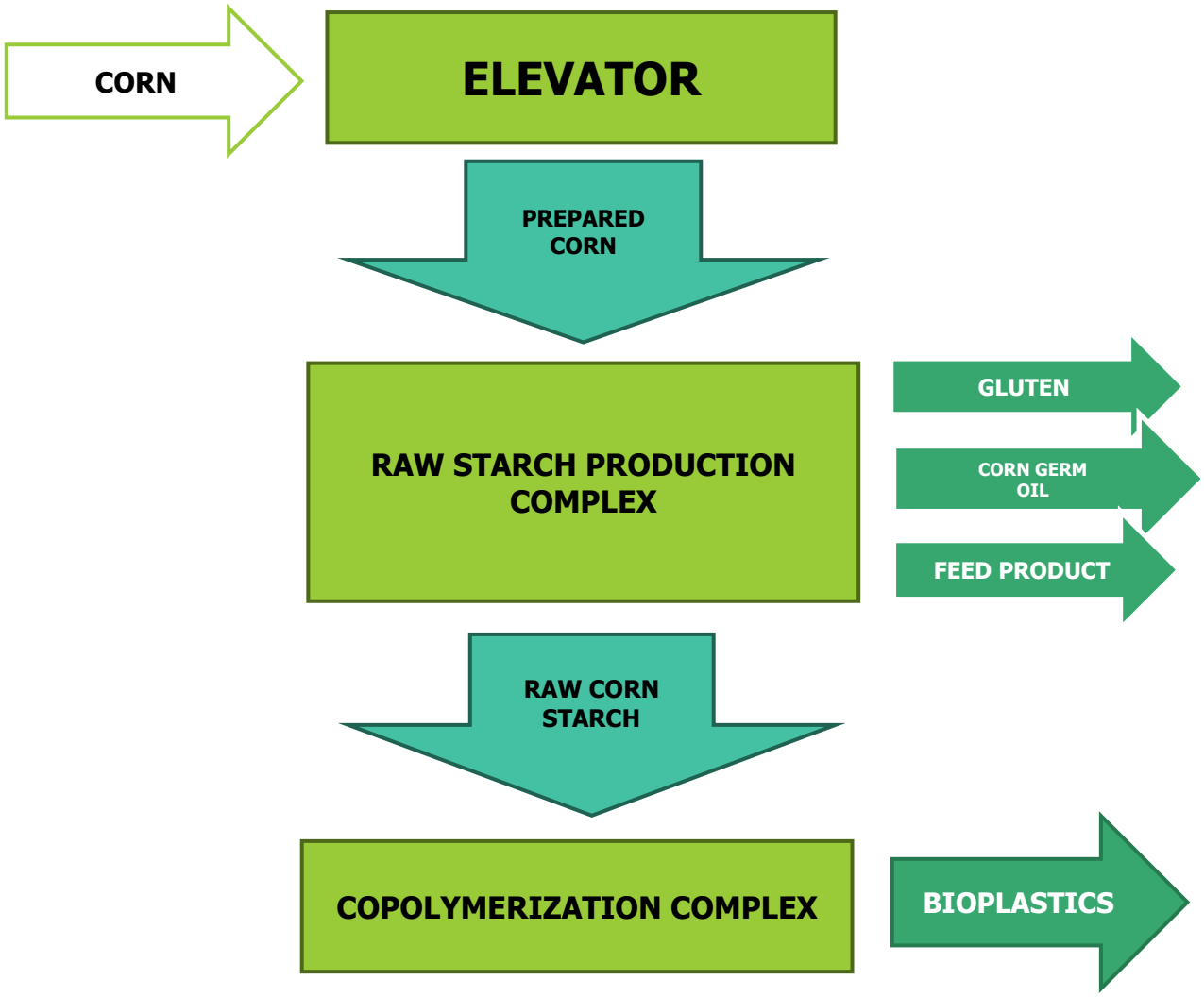
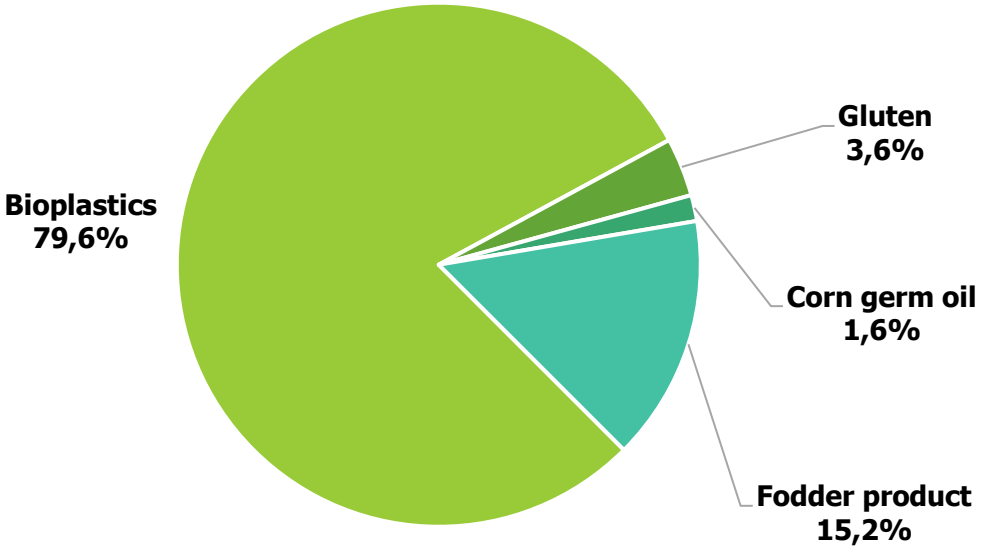


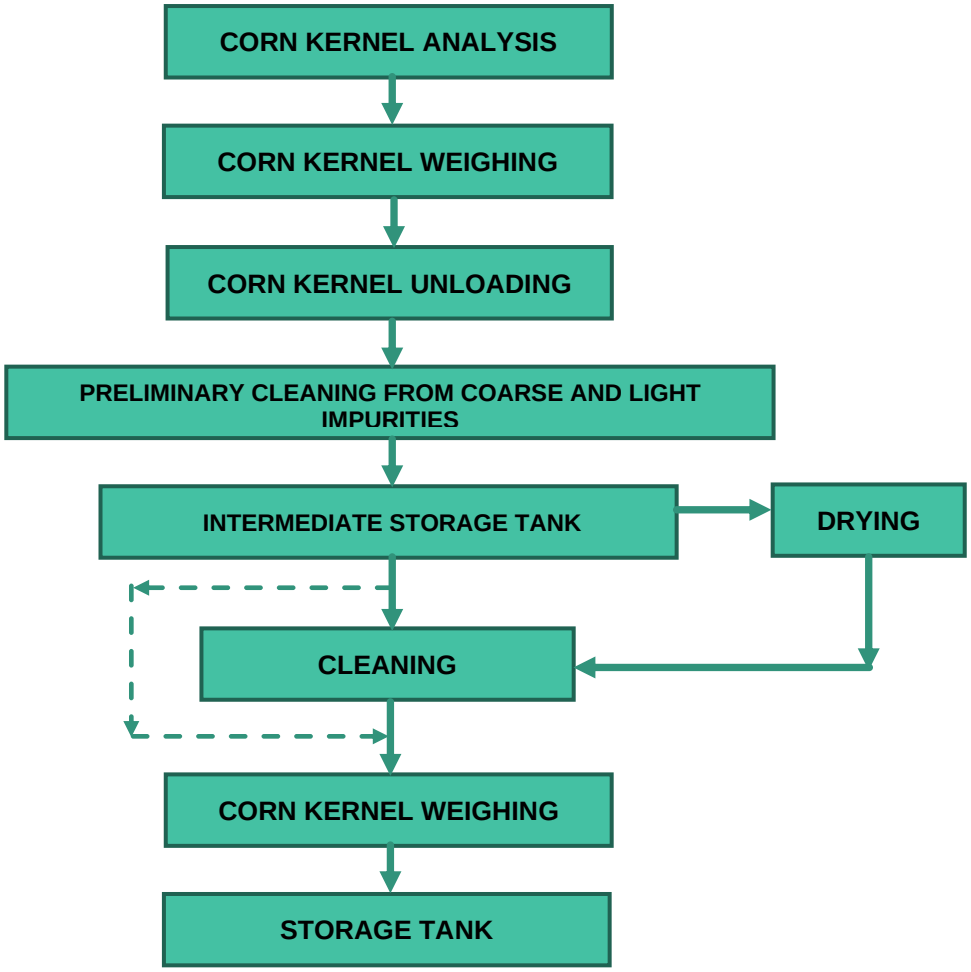
Fig. 7. Production structure of product output



Each stage of the production process has a clearly established sequence of procedures that allow for ongoing monitoring at each of the production stages.

A detailed sequence of operations for each of the 3 main production stages is presented below.

Fig. 8. Block diagram of the main operations at the elevator complex



The main purpose of the elevator complex is to carry out operations for the preparation of corn for further processing, the accumulation of corn kernel stocks in order to optimize the cost of the final product - bioplastics, by smoothing price fluctuations in the corn market.

At that, the purchase of corn is planned both "from the field" - during the harvest of corn, and from other elevator complexes:

Table 1. Plan for the formation of stocks of basic raw material - corn for the Project.

Item	2020	2021	2022	2023	2024	2025	TOTAL
Purchase of corn "from the field", t	3 000,0	17 000,0	17 000,0	17 500,0	17 500,0	17 500,0	89 500,0
Purchase of corn from other elevators, t	0,0	11 500,0	12 000,0	12 000,0	12 500,0	12 000,0	60 000,0
Stocks of corn at the beginning of the period at the	0,0	2 632,8	9 868,8	9 751,8	9 597,4	9 943,0	2 632,8

Item	2020	2021	2022	2023	2024	2025	TOTAL
elevator (after processing), t							
Consumption of corn for production, t	***73,5***	***19 599,7***	***27 941,2***	***27 941,2***	***27 941,2***	***27 941,2***	***131 437,9***
Stocks of corn at the end of the period (after processing), t	*2 632,8*	*9 868,8*	*9 751,8*	*9 597,4*	*9 943,0*	*9 788,5*	*9 788,5*

Stocks of corn at the elevator complex at the beginning and at the end of the period take into account corn kernel weight loss, taking into account the following coefficients:

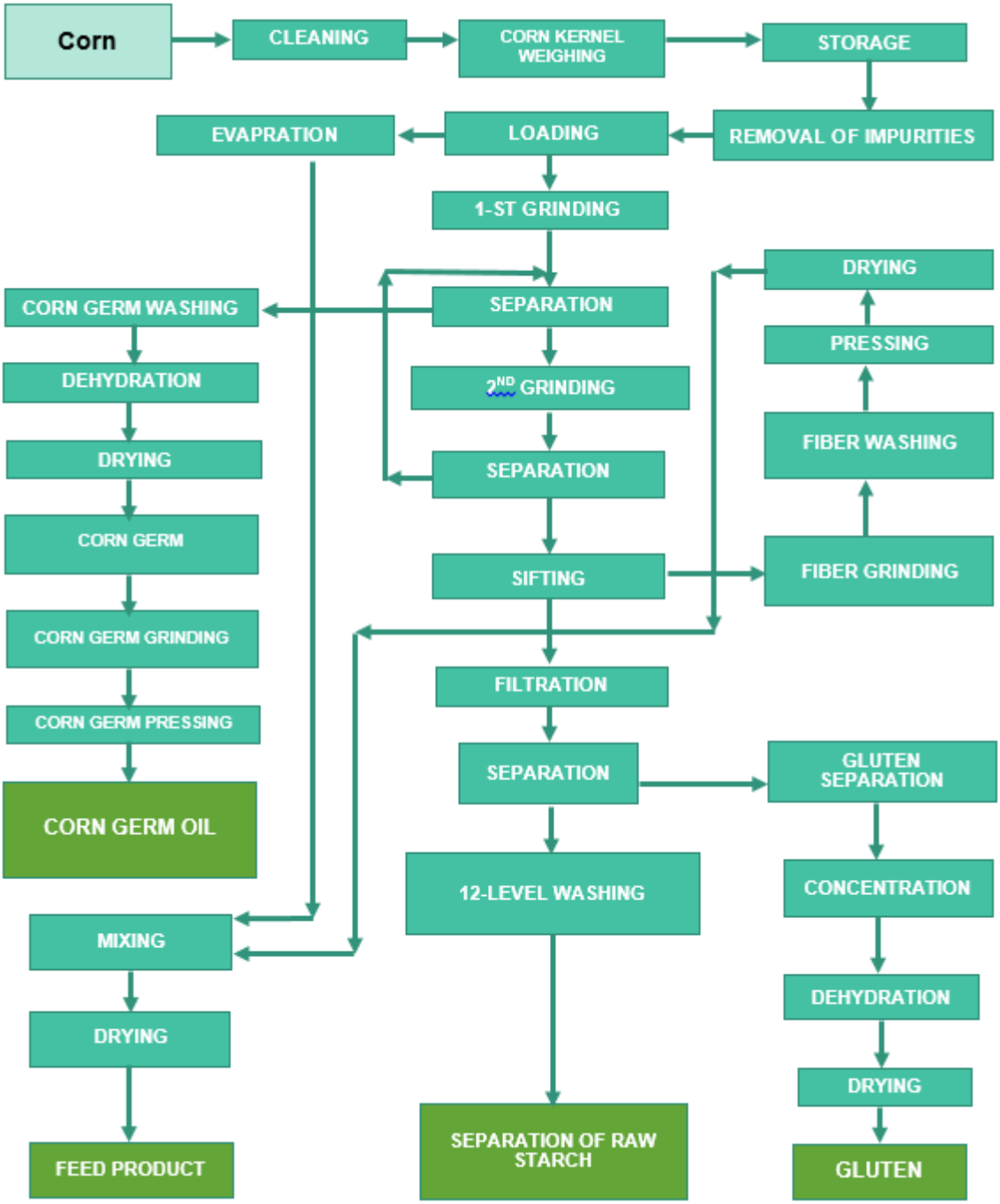
Table 2. Recommended parameters of raw material

№	Title	Size
1	Average moisture difference between corn "from the field" and corn that is loaded into storage silos	7%
2	Foreign material of corn purchased "from the field"	3%

After processing at the elevator, the corn is transferred to the complex of processing into raw corn starch, which is the basic raw material for the production of biopolymer.

"Starch" complex is the largest division of the entire enterprise. The process of separating raw corn starch is quite complex and consists of several stages presented below:

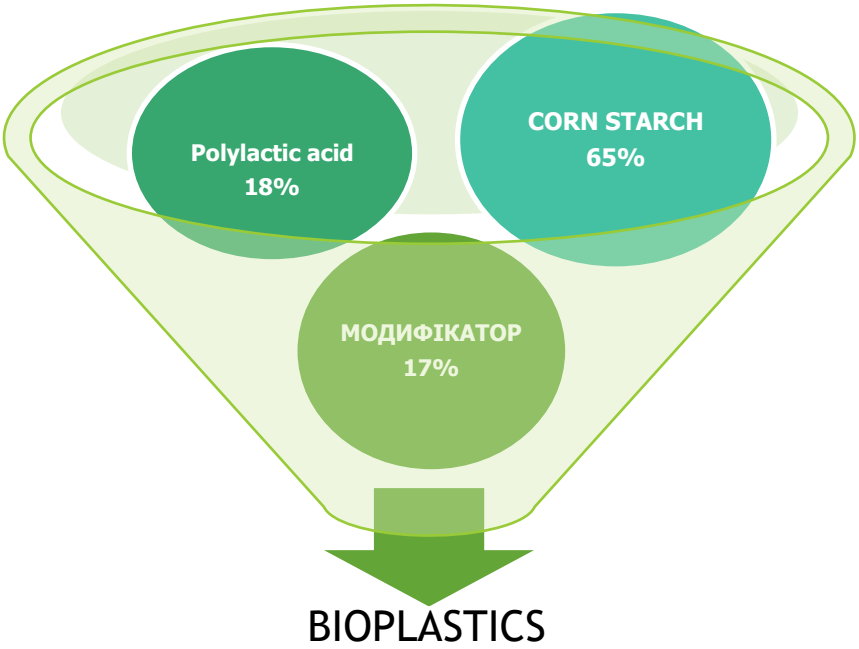
Fig. 9. Block diagram of the main operations at the raw starch plant



Glossary for the above-mentioned scheme

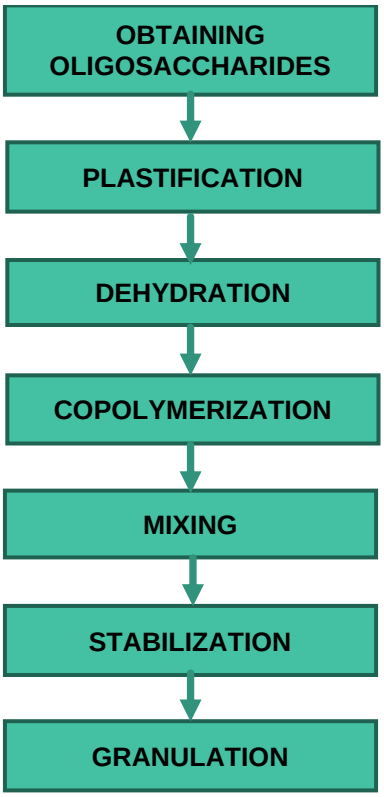
The raw corn starch thus obtained is transferred for copolymerization and biopolymer production.

Copolymer of oligosaccharides is a modified polysaccharide in which from 55% to 80% of oligosaccharides are present:



The four-stage technology for the production of biopolymer (copolymer of oligosaccharides) is a series of special equipment. At each stage, certain properties of bioplastics are formed. The scheme of the main stages is as follows:

Fig. 10. Block diagram of the main operations on the raw starch copolymerization



The products obtained in this way, depending on the percentage of individual components, can be divided into grades of bioplastics used for the production of certain types of plastic products. Each grade of copolymer, in terms of its physical and chemical properties, is intended for the production of a specific product or for mixing with other polymers or biopolymers to obtain the required properties.

3.3. Products characteristic

The products to be released at the enterprise (trade name: POLYSTARCH) are biodegradable biopolymers (bio-starch type) based on modified corn starch, which undergoes triple copolymerization.

Biopolymer POLYSTARCH is planned to be produced in the form of granules.

This biopolymer is the main component for the production of biodegradable polymer films, which can be used for the production of traditional types of plastic goods based on oil and gas, such as bags and shopping bags for supermarkets, bags used by postal and courier services, various industrial packaging and packing tapes and the like.

Product parameters are presented below:

Table 3. Biopolymer technical parameters

PROPERTIES		Unit of measurement	Testing method	Level
Main characteristics	Density	g/cm^3	ISO 1183	1,26-1,3
	Hardness	D	ASTM-D2240	50-60
Thermal properties	Melt consumption 1900C, 2.16 kg	g/10min	ISO 1133	2-4
	Melting range	^0C	ASTM-D3418	95-150
	Heat of melting	J/g	ASTM-D3417	5-6
	Temperature of thermal decomposition	^0C	ASTM-D6370	260

Table 4. Mechanical properties of the film produced using POLYSTARCH biopolymer

PROPERTIES	Unit of measurement	Testing method	Level
Tear strength (horizontal)	Map	ASTM-D882	≥25
Tear strength (vertical)	Map		≥25
Tensile strength at break (horizontal)	%		≥500
Tensile strength at break (vertical)	%		≥250
Tensile strength (horizontal)	N/mm	ASTM-D1004	≥150
Tensile strength (vertical)	N/mm		≥100

The granules are packed in closed bags with a capacity of 25 kg and 1200 kg.

Parameters of bags for packaging products:

Table 5. Parameters of biopolymer packaging

Type of packaging	Capacity, kg	Special packaging requirements
Bag	25	insert PE / Alu
Bag	1200	octabin, liner PE / Alu

Conditions for storage and use of biodegradable biopolymer POLYSTARCH

Table 6. Conditions of biopolymer storage.

Parameter	Level

Maximum temperature during transportation and storage	**70 °C**
Shelf life (provided that the packaging is kept hermetically sealed)	**Up to 12 months**
Optimum storage temperature for 12 months (provided that the package is kept hermetically sealed)	**23 °C**
Shelf life, subject to partial use and subsequent hermetic sealing of the packaging	**Up to 3 months**

By-products of the production complex are corn gluten, corn germ oil, feed product.

Corn gluten is a pure protein and has good nutritional qualities.

Gluten has a creamy yellow color and a rather pleasant bready smell. It is mainly used for feeding farm animals and poultry. In terms of calories, corn gluten ranks second after animal fats. Gluten protein is high in sulfur-containing amino acids methionine and cysteine. It also contains a sufficient amount of linoleic acid, which positively affects the productivity of animals.

Table 7. Characteristics of corn gluten.

Parameter	Specification
Appearance	Yellow powder (presence of granules is possible)
Protein content	≥60%
Humidity	≤12%
Fiber content	≤2,5%
Fat content	≤3%
Ash content	≤2,5%

Corn gluten is packed in closed bags with a capacity of 25 kg.

Corn germ oil is a fatty vegetable oil that is produced from the germ of corn kernels and is used in the cooking, cosmetic industry along with sunflower and olive oil. Corn oil is a dietary product that is easily digested by the human body. This type of oil is very similar to traditional sunflower oil, namely, it has a pleasant smell and has a color ranging from pale yellow to red-brown.

Table 8. Characteristics of corn germ oil.

PARAMETER	SPECIFICATION
Color (cuvette 133.4 mm)	≤yellow 30, red 3,0
Smell	No odor
Appearance	clarified, clear liquid
Insoluble impurities	≤0,05%
Humidity	≤0,05%
Acidity class	≤0,20 mg / kg oil
Peroxide value (mol/kg)	≤5.0

Dry corn feed is made of by-products created when corn is processed into starch. It is used for the production of compound feed, as well as an additive to feed for farm animals and poultry.

Table 9. Characteristics of corn feed product.

PARAMETER	SPECIFICATION
Appearance	pale yellow, no impurities

Protein content	≥18%
Humidity	≤12%
Fiber content	≤18%
Fat content	≤3,5%
Ash content	≤2,5%

Corn feed is packed in closed bags with a capacity of 1200 kg.

3.4. Required equipment and other assets

In the course of the Project implementation, it is planned to purchase and create the following groups of assets and equipment:

1. Land plot.
2. Renovation of existing production facilities, general production facilities and administrative buildings.
3. Creation of an elevator complex with a full cycle of reception, processing and storage of basic raw materials - corn.
4. Purchase, installation of production equipment for the production of raw corn starch and by-products.
5. Purchase and installation of auxiliary equipment and laboratory equipment.
6. Arrangement of a warehouse and general production facilities.
7. Arrangement of production support systems.

Land plot. For arrangement of the production plant, it is planned to purchase a land plot with a total area of about 54 hectares.

The main criteria for choosing a land plot are as follows:

1. Availability of production, auxiliary premises and infrastructure elements to ensure the production complex functioning.

2. Availability of a sufficient number of asphalt-paved access roads within the land plot and around it or close proximity of the land plot to the roads with such a surface in order to ensure the possibility of delivering raw materials and exporting finished products.

3. Connection of the land plot to an overhead electric line to provide the production process with the required amount of electricity. The electric line can be located near the land plot, since the project envisages the purchase and installation of a transformer substation with a total capacity of up to 630 kVA and a voltage of 10 kV.

The next step in the implementation of the Project is the preparation of production and auxiliary premises, as well as the creation of an elevator complex.

The approximate structure of premises, buildings and structures is as follows:

Table 10. Structure of production complex premises

№	DESIGNATION	AREA, sq.m.
1	Production premises for starch production	3 000
2	Production premises for placement of copolymerization equipment	1 000
3	Construction site for utilities	1 200
4	Administrative premises	500

№	DESIGNATION	AREA, sq.m.
5	Site for elevator complex	до 20 000
6	Other auxiliary premises (excluding equipment of the elevator complex)	1 500
7	Access roads, territory	3 000

In the process of renovation and additional construction, it is planned to install the necessary ventilation, lighting, water and energy supply systems.

An important aspect is the creation of a security system at the enterprise, since the production of biological polymers requires strict adherence to the sanitary control regime both at the production site and throughout the enterprise. In order to ensure high-quality protection of the production area, premises and structures, it is planned to repair the fencing and install the equipment for video surveillance and alarm systems.

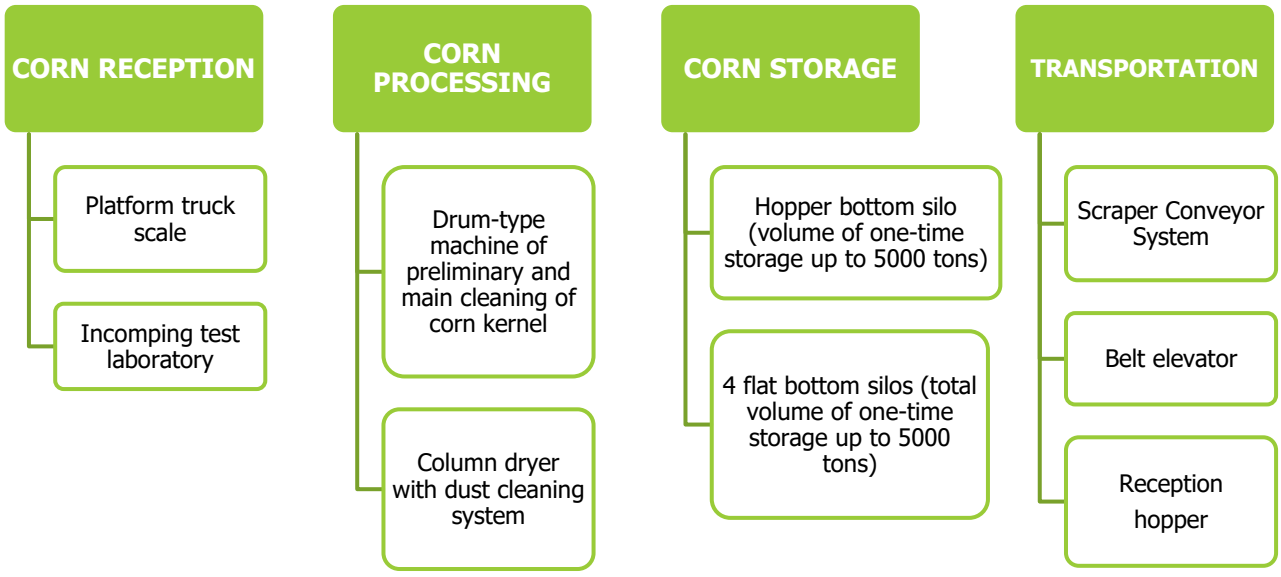
A separate checkpoint shall be created in order to secure access to the plant of unauthorized persons and vehicles.

Creation of 3 basic production zones is planned, each of which acts as a separate element of the integral property complex.

Elevator complex. The main purpose of the elevator is the primary intake of raw materials in the form of corn kernels with certain input parameters.

The elevator complex consists of the following structural elements.

Fig. 11. Equipment of elevator complex



Raw corn starch plant. On the starch plant it is planned to produce the main component of a biodegradable polymer - raw corn starch.

It should be noted that, in contrast to the classic starch production, where the finished product is dry corn starch with a moisture content of up to 14%, in this case, the final product of starch production is raw corn starch - a mixture of starch with water. This is due to the fact that the copolymerization process uses ready-made raw starch, and not dry starch, which will require additional humidification.

Storage hopper is designed for preliminary post-cleaning of corn coming from the elevator in order to remove impurities that are sent to the cake collection section.

Tanks for soaking corn with a humidification system with the use of a weak solution of sulfuric acid heated to a temperature of 50 ℃.

The sulfuric acid solution is prepared using a sulfur incineration furnace to produce SO2 gas, which is transferred to a vertical absorption tower and mixed with purified water. The result is a weak solution of sulfuric acid, which is later used to moisturize and soften corn.

The purpose of soaking is to separate water-soluble substances from the corn and soften the kernels to facilitate their subsequent mechanical separation.

Soaking time is 48 hours at 50 ℃. After this, the corn is unloaded from the tank and transported using hydraulic drives to the grinding section.

System of mills and cyclones for grinding moistened corn for its further separation into separate components: corn germ, corn cake for subsequent separation of gluten, starch and corn fibers.

The first grinding mill is a single disc (gear) mill. It is designed to crush corn kernels, release starch and extract corn germ without damage.

The separation of germ from other components occurs in a two-stage hydrocyclone system, with each stage having two runs, of which:

- the first run carries out quality reduction, separating the product selectively to achieve maximum purity;
- the second run carries out quantitative reduction of the product, collecting all the lobules for re-checking in the first run.

The second mill is similar to the first one and is placed between two runs in order to grind kernels that were not crushed in the first mill. To reduce the load on the second mill, a gravity grate is installed in front of it.

Two-stage hydrocyclone system. Each stage includes hydrocyclones for corn germ in the first run to separate overflow/underflow at a 4/1 ratio, and cyclones for corn germ in the second run to separate overflow/underflow at a 7/3 ratio.

Fine grinding mill and multi-stage washing system for separating corn fiber and restoring starch balance. The corn fiber thus separated is sent to a screw press and dryer to be mixed with corn slurry for the preparation of corn feed.

The germ/polysaccharide slurry thus obtained leaves the system with the overflow of the first run. The germ separation takes place in the germ separation system consisting of 3 grates. Flush water (process water) is added before the third grate and pumped in in counter-flow to the germ flow.

The washed germ is further dehydrated in a screw press and dried in a rotary dryer to a moisture content of 3%. The corn germ obtained in this way will contain up to 50% fat, which is extracted using a press system.

The slurry, freed from the germ, leaves the system with the overflow of the fourth run and is pumped over for release of saccharides.

Before separation of the pulp, it should be further grinded for release of saccharides contained in unmilled corn kernels. This happens at the next mill. To reduce the load on this mill, a grate is installed in front of it, which acts as the main one for separating saccharides. The grate filtrate contains free saccharides, up to 40-50% of their total content in corn kernels.

The main grate for separation of saccharides is equipped with several sieves with 50 microns openings.

The ground material is pumped into a six- or seven-stage saccharide washing system. The purpose of this system is to wash free saccharides from the pulp.

This takes place in a counterflow washing system using pressurized grates. In the first grate the sieves with 50 micron openings are used and in other grates - the sieves with 75 micron openings. Separated saccharides are the first stage filtrate, which flows into the wet saccharide reservoir where saccharides from the main sieve of the pulp washing system and the sand separation system are collected. Before transportation to the saccharide/gluten separation operation, the wet saccharides are purified from sand in a two-stage sand separation station.

The pulp processed in this way is discharged and preliminary dehydrated in a centrifuge under pressure, and then dehydrated in a screw press to 43% of dry matter. After dehydration, the pulp is mixed with the concentrated extract from the evaporator. This mixture is the feed gluten, which is further dried in dryer to a moisture content of 12%

The co-polymerization complex consists of the following elements:

1. Polymerizing reactors equipped with a paddle mixing system.
2. Pumps for feeding raw starch, polylactic acid and modifier, equipped with a dosing system.
3. Centrifuge to separate excess water.
4. Equipment for granulation of finished copolymer.
5. Equipment for packaging with the possibility of sealing the package.

Supporting equipment:

1. A reverse osmosis system designed to treat waste water for further use in the technological process.

2. Equipment of the pumping station to provide the production process with water. At that, water is directed to humidify corn kernel, to a steam plant, and is also used to rinse containers and other equipment.

3. Steam generator installation for generating steam.

General production equipment is a set of equipment for ensuring the production process, monitoring the production process, ensuring the performance of control functions for individual technological processes.

The main element of this equipment is the equipment designed to automate the production process at the enterprise.

It should be noted that the biopolymers production process is associated with strict adherence to the main technological parameters in the implementation of individual processes. The presence of the "human factor", even with the involvement of highly qualified personnel, significantly increases the risk of manufacturing products with different parameters.

Therefore, in order to ensure high quality of the final product and the possibility of ensuring the repeatability of the biopolymers parameters, it is planned to create an automated control and management system for the main production processes under the Project.

The system will consist of a set of control and measuring devices, special sensors attached to the equipment, which will monitor the main parameters of the production process with their subsequent transfer to the server for further processing. At the same time, it is planned that the system will not only monitor the parameters, but will also control the production process through a system of transmitting devices on the corresponding technological equipment.

This system will be controlled from a single operator's console using special software, the purchase, development and implementation of which is planned in the process of implementing this investment project.

The production support system will consist of the following elements:

1. Ventilation system that provides an appropriate microclimate in production facilities and purifies the air from harmful emissions associated with the production process.

2. Lighting system. Includes a lighting system for the premises of the enterprise and the adjacent territory. It is planned to use energy-saving lamps in order to minimize overhead costs under the Project.

3. Water supply system.

4. System of sewerage and water purification, with the aim of removing hazardous waste and impurities arising in the production process from the sewage waters;

5. Since the production of raw starch uses processes that require a large amount of water, which can later be used after appropriate purification, it is planned to use a reverse osmosis system, which allows obtaining high quality purified water for reuse in the production process.

6. Heating system to ensure comfortable conditions in production and administrative premises in the autumn-winter period.

7. Fire alarm and extinguishing system.

4. ORGANIZATION PLAN

4.1. Project network schedule

The forecast period of the Project is 6 years. The purchase of the necessary equipment takes place during 2021-2022.

The Project financing structure and the Project financing schedule are given below.

Fig. 12. The schedule of implementation of basic project works.

№	Types of project works	1 mon. Jan. 2021	2 mon. Feb. 2021	3 mon. Mar. 2021	4 mon. Apr. 2021	5 mon. May 2021	6 mon. June 2021	7 mon. July 2021	8 mon. Aug. 2021	9 mon. sept. 2020	10 mon. Oct. 2020	11 mon. Nov. 2020	12 mon. Dec. 2020	13 mon. Jan. 2022
1	Acquisition of land with premises													
2	Project works, environmental impact assessment, product certification													
3	Preparation of industrial premises and site for engineering networks													
4	Renovation of administrative and other premises													
5	Road and territory settlement													
6	Construction work on elevator complex													
7	Construction of supplementary facilities													
8	Acquisition of starch production equipment													
9	Delivery of starch plant equipment													
10	Installation work on starch production													
11	Adjustment work (starch factory)													
12	Acquisition of equipment for modification of raw starch													
13	Installation work on the equipment of modification of raw starch													
14	Adjustment work (modification of raw starch)													
15	Purchasing of polymerization equipment (including labolatory entrence/exit control)													
16	Installation work on polymerization equipment													
17	Starting-up and adjustment works (polimerazation)													
18	Purchasing of elevator equipment (including the elevator labolatory)													
19	Installation elevator works													
20	Starting-up and adjustment works (elevator)													
21	Purchasing and installation of additional equipment													
22	Drilling and well settlement													
23	Purchasing of loading equipment													
24	Purchasing of tools, furniture, equipment													

Table 11. Project works and investment schedule

№	Items and expenses	2020	2021	Own funds	Investment funds (on a repayable basis)	TOTAL
1	Acquisition of a land plot with premises	$1 500 000	$0	$0	$1 500 000	$1 500 000
2	Design work, EIA and product certification	$97 407	$90 000	$0	$187 407	$187 407
3	Polymerization technology	$2 000 000	$0	$2 000 000	$0	$2 000 000
4	Preparation of industrial premises and site for utilities	$390 000	$0	$0	$390 000	$390 000
5	Administrative and other premises	$150 000	$0	$0	$150 000	$150 000
6	Arrangement of roads and territory	$150 000	$0	$0	$150 000	$150 000
7	Construction work on the elevator complex	$130 000	$0	$0	$130 000	$130 000
8	Construction of auxiliary structures	$140 741	$0	$0	$140 741	$140 741
9	Purchase of equipment for starch production (excluding duties and VAT)	$4 868 281	$0	$0	$4 868 281	$4 868 281
10	Delivery of equipment for starch production (payment of duty)	$243 414	$0	$0	$243 414	$243 414
11	Delivery of equipment for starch plant	$486 828	$0	$0	$486 828	$486 828
12	Payment of duty on equipment for starch plant	$1 022 339	$0	$0	$1 022 339	$1 022 339
13	Installation work on starch production	$685 403	$0	$0	$685 403	$685 403
14	Commissioning work on starch production	$306 702	$0	$0	$306 702	$306 702
15	Acquisition of equipment for modification of raw starch	$595 200	$0	$0	$595 200	$595 200
16	Installation work on the equipment of modification of raw starch	$131 520	$0	$0	$131 520	$131 520
17	Adjustment work (modification of raw starch)	$14 880	$14 880	$0	$29 760	$29 760
18	Purchase of polymerization equipment	$637 000	$0	$0	$637 000	$637 000
19	Installation work on polymerization equipment	$90 000	$0	$0	$90 000	$90 000
20	Commissioning work on polymerization equipment	$15 000	$15 000	$0	$30 000	$30 000
21	Purchase of elevator equipment	$1 194 628	$0	$0	$1 194 628	$1 194 628
22	Installation work on the elevator	$325 892	$0	$0	$325 892	$325 892
23	Commissioning work on the elevator	$49 055	$0	$0	$49 055	$49 055
24	Purchase and installation of additional equipment	$358 904	$0	$0	$358 904	$358 904
25	Drilling and arrangement of well	$25 926	$0	$0	$25 926	$25 926
26	Purchase of loading equipment	$36 000	$0	$0	$36 000	$36 000
27	Purchase of tools, furniture, inventory	$65 000	$0	$0	$65 000	$65 000
28	Other investment costs	$471 304	$3 596	$0	$474 900	$474 900
29	Working capital replenishment	$351 120	$987 914	$0	$1 339 034	$1 339 034
	Total investment	$16 532 542	$1 111 390	$2 000 000	$15 643 932	$17 643 932

4.2. Required personnel and HR policy

The effectiveness of the company's activities staffing shall be achieved through the use of effective methods and standards at the stage of personnel selection, in particular, questionnaires, interviews, a multi-level system for identifying personal and professional skills of a candidate for employment.

Labor relations, including employee remuneration systems, labor safety relationships and additional remuneration for achieving certain results, shall be determined by the collective agreement, labor agreements with the employee and the relevant regulations in the field of labor relations regulation.

The formation of labor relations, working hours, the provision of vacations, social protection and social security took place in full compliance with the requirements of labor legislation on the terms of the collective agreement and in accordance with the internal labor regulations.

By functional characteristics, personnel involved in the implementation of the Project can be conditionally divided into the following groups:

1. Administrative personnel: management of the company and employees who directly cooperate with management.

2. Production personnel - personnel of an elevator complex, a complex for the production of starch milk, a copolymerization complex.

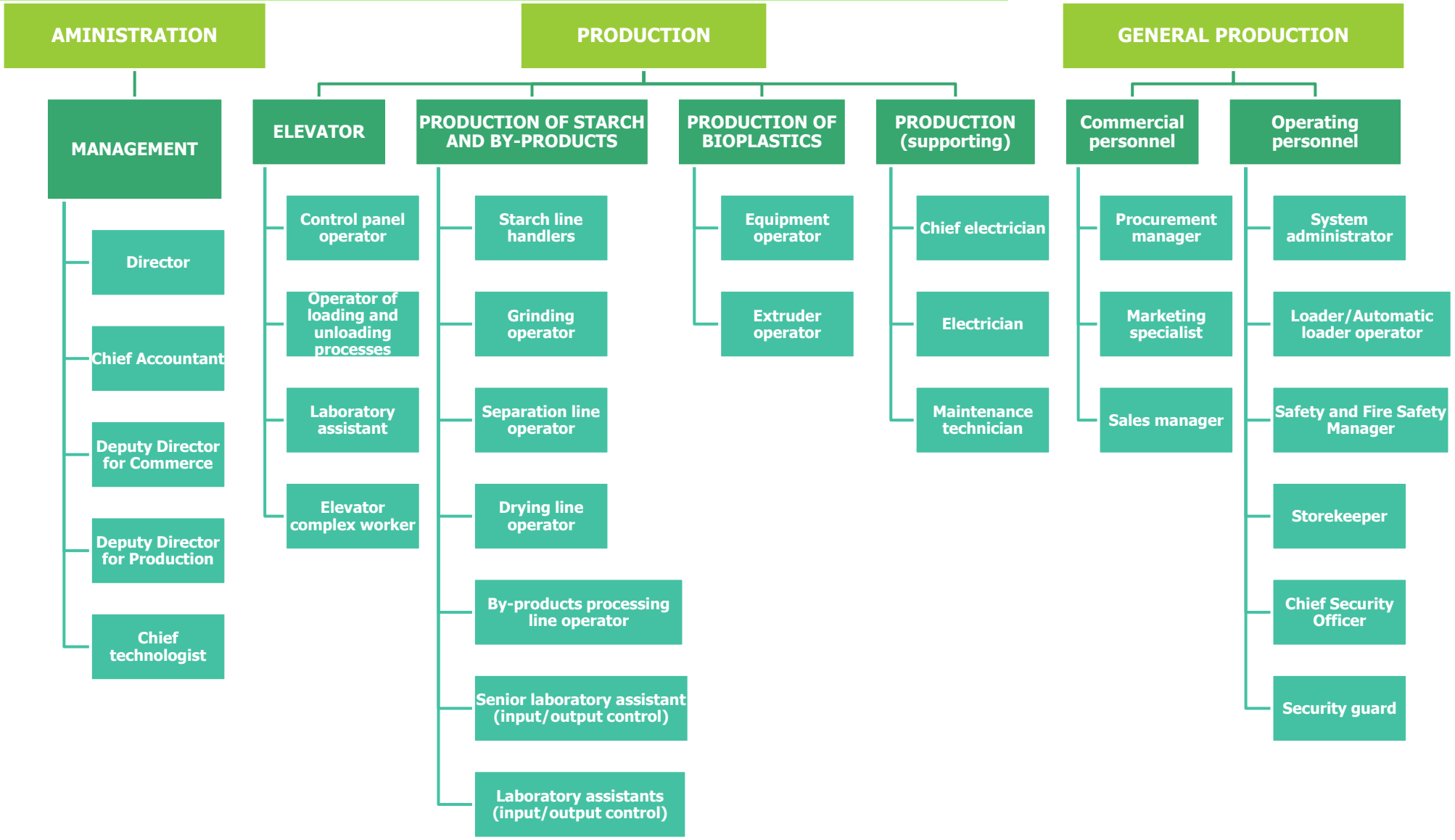
3. General production personnel - this group of personnel includes commercial personnel and service personnel.

- Commercial personnel - personnel of the company engaged in the sale of products, the formation of sales channels for products.
- Service personnel – such personnel services the work of administrative and production personnel on distinct sections and undertakes work on general servicing of production complex.

An important aspect of the project personnel formation process is the gradual increase in the number of personnel, taking into account the production volumes.

The planned number of personnel to be involved in the Project is 153 people.

Organigram of the Project will be as follows:


AMINISTRATION
MANAGEMENT
Director
Chief Accountant
Deputy Director for Commerce
Deputy Director for Production
Chief technologist
PRODUCTION
ELEVATOR
Control panel operator
Operator of loading and unloading processes
Laboratory assistant
Elevator complex worker
PRODUCTION OF STARCH AND BY-PRODUCTS
Starch line handlers
Grinding operator
Separation line operator
Drying line operator
By-products processing line operator
Senior laboratory assistant (input/output control)
Laboratory assistants (input/output control)
PRODUCTION OF BIOPLASTICS
Equipment operator
Extruder operator
PRODUCTION (supporting)
Chief electrician
Electrician
Maintenance technician
GENERAL PRODUCTION
Commercial personnel
Procurement manager
Marketing specialist
Sales manager
Operating personnel
System administrator
Loader/Automatic loader operator
Safety and Fire Safety Manager
Storekeeper
Chief Security Officer
Security guard

Staff schedule of the personnel involved in the Project implementation

Table 12. Staff schedule under the Project.

Personnel		Number of positions	Number of shifts	Number of persons	Monthly salary per person, USD	Additional payments (benefits, sick pay, allowances)	Payroll fund, USD	Individual entrepreneurs accrual, USD	Total expenses for labor remuneration, USD
Administration personnel									
	Director	1	1	1	$3 000	$330	$3 330	$733	$4 063
	Chief Accountant	1	1	1	$2 400	$264	$2 664	$586	$3 250
	Deputy Director for Commerce	1	1	1	$2 400	$264	$2 664	$586	$3 250
	Chief technologist	1	1	1	$2 400	$264	$2 664	$586	$3 250
	Deputy Director for Production	1	1	1	$2 400	$264	$2 664	$586	$3 250
TOTAL administration personnel				**5**			**$13 986**	**$3 077**	**$17 063**
Production personnel									
Production (supporting) personnel	Chief Electrician	1	1	1	$2 400	$264	$2 664	$586	$3 250
	Electrician	2	4	8	$700	$77	$6 216	$1 368	$7 584
	Maintenance technician	4	4	16	$700	$77	$12 432	$2 735	$15 167
	Total production (supporting) personnel			***25***			***$21 312***	***$4 689***	***$26 001***
Elevator	Control Panel Operator	2	2	4	$550	$61	$2 442	$537	$2 979
	Operator of loanding-unloading processes	2	2	4	$430	$47	$1 909	$420	$2 329
	Laboratory Assistance	1	2	2	$550	$61	$1 221	$269	$1 490
	Elevator Complex Worker	2	2	4	$550	$61	$2 442	$537	$2 979
	Total elevator personnel			***14***			***$8 014***	***$1 763***	***$9 777***
Production of starch and by-products	Starch Line Loaders	3	4	12	$550	$61	$7 326	$1 612	$8 938
	Grinding Operator	3	4	12	$550	$61	$7 326	$1 612	$8 938
	Separation Line Operator	2	4	8	$550	$61	$4 884	$1 074	$5 958
	Drying Line Operator	2	4	8	$550	$61	$4 884	$1 074	$5 958
	Operator of Germ, Gluten, Feed Product Processing Line	6	4	24	$550	$61	$14 652	$3 223	$17 875
	Senior Laboratory Assistance (input/output control)	1	2	2	$800	$88	$1 776	$391	$2 167
	Laboratory Assistants (input/output control)	2	4	8	$550	$61	$4 884	$1 074	$5 958
	Total starch production personnel			***74***			***$45 732***	***$10 061***	***$55 793***

Personnel		Number of positions	Number of shifts	Number of persons	Monthly salary per person, USD	Additional payments (benefits, sick pay, allowances)	Payroll fund, USD	Individual entrepreneurs accrual, USD	Total expenses for labor remuneration, USD
Bioplastics production	Equipment Operator	2	4	8	$550	$61	$4 884	$1 074	$5 958
	Extruder Operator	1	4	4	$550	$61	$2 442	$537	$2 979
	Total bioplastics production personnel			***12***			***$7 326***	***$1 612***	***$8 938***
TOTAL production personnel				**125**			**$82 384**	**$18 125**	**$100 509**
General Production Personnel									
Commercial personnel	Procurement Manager	1	1	1	$750	$83	$833	$183	$1 016
	Marketing Specialist	1	1	1	$1 000	$110	$1 110	$244	$1 354
	Sales Manager	1	1	1	$1 500	$165	$1 665	$366	$2 031
Operating personnel	System Administrator	1	1	1	$1 500	$165	$1 665	$366	$2 031
	Loader/Automatic Loader Operator (warehouse)	2	2	4	$431	$47	$1 914	$421	$2 335
	Safety and Fire Safety Manager	1	1	1	$650	$72	$722	$159	$880
	Storekeeper	1	2	2	$650	$72	$1 443	$317	$1 760
	Chief Security Officer	1	1	1	$1 200	$132	$1 332	$293	$1 625
	Security Guard	3	4	12	$250	$28	$3 330	$733	$4 063
TOTAL General production personnel				**24**			**$14 013**	**$3 083**	**$17 095**
TOTAL for the Project				**154**			**$110 383**	**$24 284**	**$134 667**

The strategic goal of work with the personnel is to form an active team of specialists who can effectively solve tasks for the current and strategic development of the Project.

Priorities in work with personnel:

1. Management of the personnel number and variability.
2. Development of knowledge and professional skills of the personnel.
3. Personnel rotation and promotion based on achievements.
4. Assessment and motivation of the personnel through the formation of an effective remuneration system (bonuses, allowances, etc.)
5. Formation of corporate culture.
6. Effective interaction between employees of the companies created as a result of the Project implementation.

To implement the personnel policy, it is necessary to fulfill the following strategic tasks:

- training and professional development of the personnel of enterprises;
- improving social policy of the companies and formation of the personnel motivation system;
- formation of corporate culture
- optimal delegation of authority and responsibility.

5. MARKETING PLAN

The products are planned to be sold using the existing sales routes to large manufacturers of plastic products, as well as through the formation of a dealer network that will cover the entire territory of Ukraine. In the future, it is planned to enter gradually the market of Eastern Europe and the Middle East.

In the process of the Project development, it is planned to use modern management technologies. An important process of activity is the analysis of the external environment and development conditions on which the model of strategic development of the Project in the future will be based.

The basic strategy of the Project provides for a gradual increase in the production of bioplastics, gaining market share and economic growth of the companies participating in the Project.

Marketing activities will include:

- Preparation of articles, registration of products and companies in databases.
- Participation in exhibitions and presentations.
- Creation and placement of news about the advantages and prospects of using bioplastics in the production of plastic products.
- Lobbying at the state level for the gradual replacement of plastic made of oil products with bioplastics, which will significantly reduce environmental pollution
- Placement of advertisements in specialized print media.
- Creation of a website and placement of data on the products: their main advantages and possibilities of practical application.
- Website promotion using contextual advertising and SEO promotion

Table 13. Methods of the website promotion

Distribution and promotion tools	Description	Goal	Implementation mechanism
Context advertising	Advertising messages in search engines, forum sites and blogs.	Attracting users to the site, getting acquainted with prices, increasing sales.	Ads are displayed next to the search results on the Internet
SEO promotion	The site is promoted by well-defined, pre-agreed keywords	Attracting customers to the site, getting acquainted with prices, increasing sales	The site ranks high in the search results for certain search phrases.

6. INVESTMENT PLAN

The total cost of the project is **$ 11,803,143**.

Financing of the project is planned from the use of the investor's funds and the own contribution of the project initiator.

Investments will be directed in the following directions:

Table 14. Main directions of investment under the Project

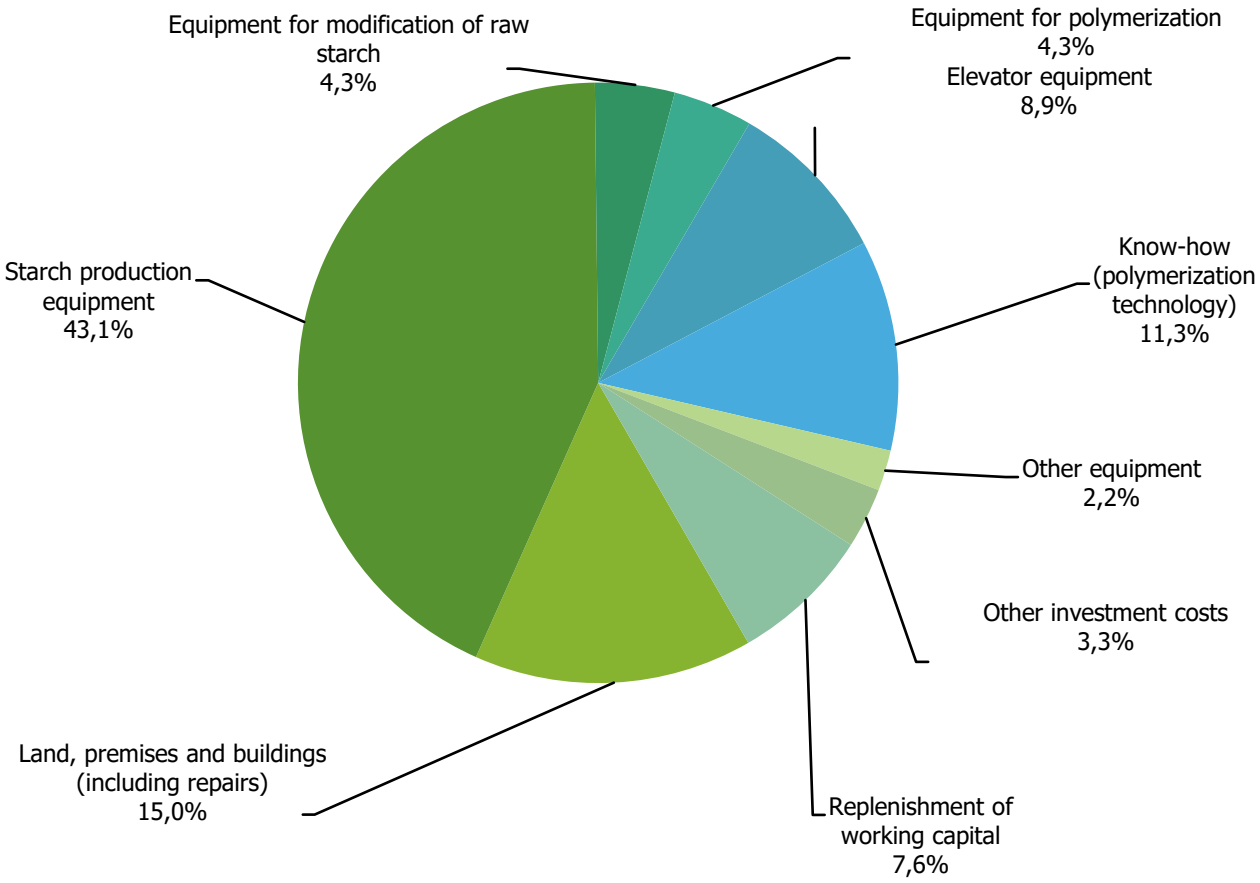
Items and expenses	Own funds	Investment funds	TOTAL
Acquisition of a land plot with premises	$0	$1 500 000	$1 500 000
Design work, EIA and product certification	$0	$187 407	$187 407
Polymerization technology	$2 000 000	$0	$2 000 000
Preparation of industrial premises and site for engineering networks	$0	$390 000	$390 000
Administrative and other premises	$0	$150 000	$150 000
Arrangement of roads and territory	$0	$150 000	$150 000
Construction work on the elevator complex	$0	$130 000	$130 000
Construction of auxiliary structures	$0	$140 741	$140 741
Purchase of equipment for starch production (excluding duties and VAT)	$0	$4 868 281	$4 868 281
Delivery of equipment for starch production (payment of duty)	$0	$243 414	$243 414
Delivery of equipment for starch plant	$0	$486 828	$486 828
Payment of VAT on equipment for starch plant	$0	$1 022 339	$1 022 339
Installation work on starch production	$0	$685 403	$685 403
Commissioning work on starch production	$0	$306 702	$306 702
Acquisition of equipment for modification of raw starch	$0	$595 200	$595 200
Installation work on the equipment of modification of raw starch	$0	$131 520	$131 520
Adjustment work (modification of raw starch)	$0	$29 760	$29 760
Purchase of polymerization equipment (including laboratory input / output control)	$0	$637 000	$637 000
Installation work on polymerization equipment	$0	$90 000	$90 000
Commissioning work on polymerization equipment	$0	$30 000	$30 000
Purchase of equipment for an elevator (including an elevator laboratory)	$0	$1 194 628	$1 194 628
Installation work on the elevator	$0	$325 892	$325 892
Commissioning work on the elevator	$0	$49 055	$49 055
Purchase and installation of additional equipment	$0	$358 904	$358 904
Well	$0	$25 926	$25 926
Purchase of loading equipment	$0	$36 000	$36 000
Purchase of tools, furniture, inventory	$0	$65 000	$65 000
Other investment costs	$0	$474 900	$474 900
Working capital replenishment	$0	$1 339 034	$1 339 034
PROJECT COST	$2 000 000	$15 643 932	$17 643 932

The largest volume of investments will be directed to the purchase of equipment - almost 62,8%, the next item is the acquisition of a land plot and the construction and repair of necessary buildings and structures is up to 15,0% of investments, the introduction of copolymerization technology into newly

created innovative manufacture is up to 11,3% of investments, and the replenishment of working capital in the process of organizing the production and work of the companies at the beginning of the Project - up to 7,6%. Other investment costs take up to 3,3% of total investments.

The detailed structure of investments for the Project is shown in the diagram.

Fig. 13. Investment structure



7. FINANCING PLAN OF THE PROJECT

This section contains an assessment of the investment attractiveness and profitability of the Project on organization of the biopolymers manufacturing plant for agricultural production.

It should be noted that the current business plan describes and calculates the conceptual aspects and economic indicators in the organization and conduct of the selected type of business. With the further organization and implementation of the Project, the compliance and output of the enterprise to the predicted calculated indicators, just like the final cost of the Project, will depend on the current economic situation in the country, the selected counterparties, including the suppliers of the necessary equipment, as well as on the chosen methods of building relationships with clients, the policy of cooperation with suppliers of resources, effective management and marketing policy. Therefore, when considering the document, it is necessary to take into account that the calculated data are forecast and may partially differ from the actual results achieved by the enterprise.

7.1. Initial data for calculations and their argumentation.

For organization of the calculations under the Project, the following business parameters were taken, which must be divided into main groups:

- General parameters
- Enterprise parameters
- Tax parameters

General parameters are used to describe the main assumptions in the calculation process that affect the financial part of the Project.

Table 15. General parameters of the Project

№	Parameter	Expectation
1.	**General parameters**	
1.1	Calculation period of the Project, years	6 years
1.2	Currency rate (USD/UAH)	27,00 ₴
1.3	Currency rate (EUR / UAH)	29,70 ₴
1.4	Currency rate (USD / EUR)	1,10
1.7	Discount rate, % p.a.	18,0%

Enterprise parameters relate to the parameters of the general implementation of the Project, that is, the indicators necessary for making calculations for the Project.

Table 16. Parameters of the enterprise work

№	Parameter	Expectation
2.	**Parameters of the enterprise work**	
2.1	Starch line production capacity, tons per year	20 000
2.2	Number of working days per year (projected)	330
2.3	Number of working days per month (project)	28
2.4	Number of shifts per day	3
2.5	Working hours per shift	8
2.6	Forecasted production volume per month, tons	1 667
2.7	Forecasted production volume per day, tons	60,6

№	Parameter	Expectation
2.8	Forecasted production volume per hour, tons	2,53
	PRODUCT OUTPUT (annual volume)	
2.9	POLYSTARCH (output biopolymer)	30 769
2.10	*the need for basic raw materials (corn)*	*29 412*
2.11	Gluten (corn)	1 379
2.12	Corn germ oil	612
2.13	Feed product	5 788
2.14	Loss (moisture, waste, etc)	1 632

Tax parameters adopted for the Project, in accordance with Ukrainian legislation on the activities of enterprises on the territory of Ukraine.

Table 17. Taxation

№	Parameter	Expectation
3.	**Taxation**	
3.1	Incom tax	18,0%
3.2	Duty (average rate)	5,00%
3.3	VAT	20,0%
3.4	VAT export	0,0%
3.5	Unified social tax, %	22,0%

Output data for calculations are conventionally divided into the following groups:

1) Prerequisites for the formation of a finished products sales plan for the Project.

The product sales plan was formed taking into account the timing of the start of the products manufacturing under the Project, the timing of the acquisition and commissioning of equipment and the current situation on the biopolymer market.

When calculating the plan for the sale of products, the approximate level of prices for the main products and by-products, the production of which is planned under the Project, was taken into account:

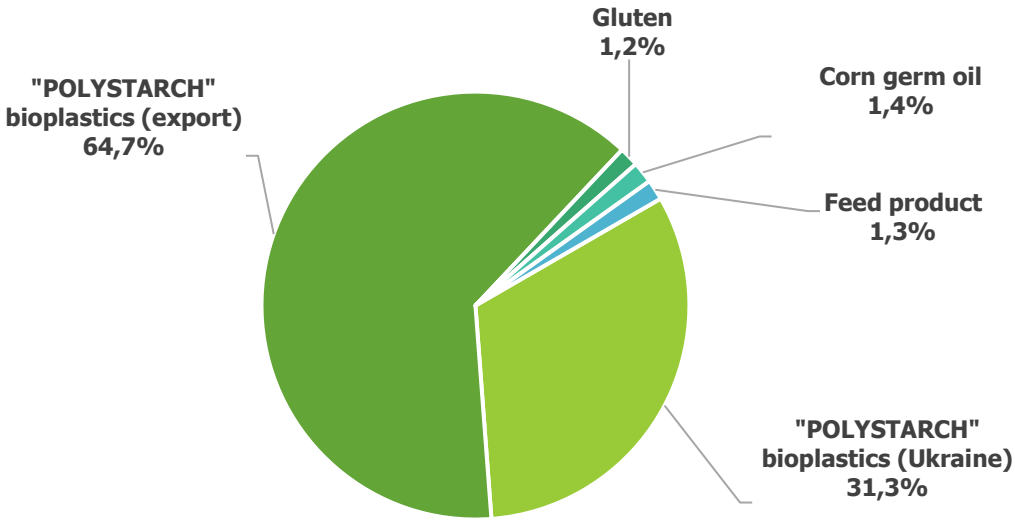
Таблица 18. Product prices

№	ITEM	Price for 1 ton (incl.VAT)	Price for 1 ton (excl.VAT)
1	**«POLYSTARCH» biopolymer (on the internal market of Ukraine, on EXW-plant terms)**	**$2 300,00**	**$1 916,67**
2	**«POLYSTARCH» biopolymer (export price, on EXW-plant terms)**	**$2 300,00**	**$2 300,00**
3	**Corn gluten**	**$600,00**	**$500,00**
4	**Corn germ oil**	**$1 500,00**	**$1 250,00**
5	**Feed product**	**$150,00**	**$125,00**

It is important to note that in order to take into account the possible risks associated with the further development of biopolymer production in the world and increased competition in the bioplastics market, the calculations for the Project took into account the rate of decrease in the average price for the main POLYSTARCH biopolymer product within 4% per year both in the domestic and foreign markets.

The structure of product sales under the Project (by sales volume) is as follows:

Fig. 14. Sales structure (by sales volume, in monetary terms)



2) Prerequisites for the formation of Project costs

The total of operating expenses for the Project is divided into three main groups:

1. Labor costs;

2. Cost of materials and energy carriers;

3. Other expenses.

Labor costs are formed based on the basic salary of each employee, the work schedule, additional payments (sick pay, allowances, etc.), bonuses and taxes and fees charged to the payroll fund.

The amount of additional payments, namely sick pay, allowances, benefits, etc. averages up to 11% of the basic salary of an employee, while the size of the bonus to personnel is 1% of the company's revenue.

Details of labor costs are presented in clause 4.2 of this Project.

As for the main costs for materials and energy carriers, then given the presence of structurally separated elements of production: an elevator, a complex for the production of raw corn starch, a copolymerization complex, they can be divided into three separate groups:

- costs of preparing corn for further processing into raw corn starch and by-products - the cost of the elevator;

- costs associated with the processing of prepared corn into raw corn starch, gluten, corn germ oil, feed product - costs of the raw starch production complex;

- costs arising in the process of starch copolymerization.

The costs of preparing corn for further processing consist of the following costs:

- the cost of the corn purchase from the field - during the corn harvesting season or costs of the corn purchase from other elevators, when the stocks of the own elevator complex will be below 3000 tons at the end of the month;

- the cost of electricity required for processing corn purchased from the field at the rate of 0.3 kW/h of unprocessed corn;

- the cost of purchasing natural gas for drying corn purchased from the field to the required moisture level at the rate of 1.1 cu.m. per 1 ton-percent of moisture with an average moisture loss during drying about 7%;

- the cost of electricity required for storing corn at elevator complexes at the rate of 3.9 kW/h per 1 ton of storage for a month;

The costs of processing corn into raw starch and by-products include the following types of costs:

- the cost of purchase of sulfur used in the technological process of pretreatment of corn at the rate of 2.5 kg per 1 ton of dry corn starch;

- the cost of water used in the technological process. The volume of water required for the production of starch is about 2.75 tons per 1 ton of starch. At that, in order to reduce water consumption, technological wastewater arising in the production process is purified using a reverse osmosis system and can be reused in the next cycle;

- cost of purchasing natural gas for the production of the required amount of steam, at the rate of 33.52 cu.m. per 1 ton of starch;

- electricity costs. The volume of electricity required for the production of 1 ton of starch is about 206 kW/h.

The costs of copolymerizing raw corn starch consist of the following elements:

- the cost of purchasing modifier, based on an average of 170 kg of modifier per 1 ton of biopolymer;

- the cost of purchasing polylactic acid (PLA), which is required in the process of starch copolymerization, at the rate of up to 180 kg per 1 ton of finished product.

Other expenses include overhead production costs, advertising and promotion costs, additional general production costs.

The amount of overhead production costs, covering the cost of packaging products, compensation for possible technological losses of energy carriers, etc. is 3% of the production cost of products.

The costs of advertising and promoting products on the market are taken into account at the level of 3% of revenue and for the forecast period make up to $ 6,439,915, which is associated with the need for high costs due to the need for popularization and further promotion of a relatively new product on the market.

The amount of additional general production costs is determined at the level of 2% of the total production costs of the enterprise.

3) Prerequisites for calculating depreciation charges for the Project.

Depreciation deductions are a legal method of reducing taxable profits, and therefore are paid by an enterprise for income tax.

The calculation of depreciation deductions under the Project was carried out on the basis of the Tax Code of Ukraine, taking into account the type of assets and their useful life. For these purposes, the fixed assets acquired under the Project were grouped into groups:

- Land (the minimal permissible period of gainful utilization according to the TCU is not set).
- Buildings and constructions (the minimal permissible period of gainful utilization according to the TCU is 15 years).
- Vehicles and equipment (the minimal permissible period of gainful utilization according to the TCU is 5 years).
- Vehicles and other movable mechanisms (the minimal permissible period of gainful utilization according to the TCU is 5 years).
- Tools, furniture and inventory (the minimal permissible period of gainful utilization according to the TCU is 4 years).
- Intangible assets (the minimal permissible period of gainful utilization is 5 years).

The total amount of depreciation expenses under the Project is presented in the following table:

Table 19. Depreciation deductions.

YEAR	Initial value	Wear	Book value	1st quarter	2d quarter	3d quarter	4th quarter	TOTAL
2020	$1 250 000	$10 417	$10 417	$10 417	$10 417	$41 667	$1 250 000	$10 417
2021	$13 164 582	$575 920	$575 920	$575 920	$575 920	$2 303 679	$13 164 582	$575 920
2022	$13 164 582	$575 920	$575 920	$575 920	$575 920	$2 303 679	$13 164 582	$575 920
2023	$13 164 582	$575 920	$575 920	$575 920	$575 920	$2 303 679	$13 164 582	$575 920
2024	$13 164 582	$575 920	$575 920	$575 920	$575 920	$2 303 679	$13 164 582	$575 920
2025	$13 164 582	$572 534	$572 534	$572 534	$572 534	$2 290 137	$13 164 582	$572 534
	$13 164 582					**$11 546 520**	**$13 164 582**	

The residual value of the equipment at the end of this Project implementation period will amount to **$1 618 062.**

7.2 Sales Forecast

The total sales volume for the entire period of the Project implementation makes up to **$296 009 399.**

Table 20. Forecasted sales plan (product shipment)

ITEM	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
"POLYSTARCH" bioplastics (internal market)	**8 863**	**8 769**	**8 769**	**8 769**	**8 769**	**43 940**
Price (bioplastics), per 1 ton	*$2 283*	*$2 197*	*$2 109*	*$2 025*	*$1 944*	*$2 111*
Proceeds (bioplastics, internal market)	**$20 232 397**	**$19 265 165**	**$18 494 559**	**$17 754 776**	**$17 044 585**	**$92 791 483**
"POLYSTARCH" boiplastics (export)	**9 808**	**20 462**	**20 462**	**20 462**	**20 462**	**91 654**
Price (bioplastics), per 1 ton	*$2 283*	*$2 197*	*$2 109*	*$2 025*	*$1 944*	*$2 111*
Proceeds (bioplastics, export)	**$22 240 343**	**$44 952 053**	**$43 153 971**	**$41 427 812**	**$39 770 699**	**$191 544 877**
Gluten	**919**	**1 310**	**1 310**	**1 310**	**1 310**	**6 161**
Price (Gluten)), per 1 ton	*$600*	*$600*	*$600*	*$600*	*$600*	*$600*
Proceeds (Gluten)	**$551 535**	**$786 265**	**$786 265**	**$786 265**	**$786 265**	**$3 696 594**
Corn germ oil	**408**	**581**	**581**	**581**	**581**	**2 732**
Price (Corn germ oil), per 1 ton	*$1 500*	*$1 500*	*$1 500*	*$1 500*	*$1 500*	*$1 500*
Proceeds (Corn germ oil)	**$611 510**	**$871 765**	**$871 765**	**$871 765**	**$871 765**	**$4 098 569**
Feed product	**3 857**	**5 499**	**5 499**	**5 499**	**5 499**	**25 853**
Price (Feed product), per 1 ton	*$150*	*$150*	*$150*	*$150*	*$150*	*$150*
Proceeds (Feed product)	**$578 582**	**$824 824**	**$824 824**	**$824 824**	**$824 824**	**$3 877 876**
RETURN	**$44 214 367**	**$66 700 071**	**$64 131 382**	**$61 665 441**	**$59 298 138**	**$296 009 399**

The proceeds from the products sale will be adjusted taking into account the delay in the receipt of funds for the shipped products to the account of the enterprise. On average, the delay when selling products on the domestic market is up to 1 month, when selling for export up to 2 months.The total amount of proceeds for the shipped products will be **$287 876 453**:

Table 21. Прогнозний план надходження виручки за відвантажену продукцію

ITEM	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Proceeds (bioplastics, internal market)	**$18 585 586**	**$19 331 038**	**$18 557 796**	**$17 815 484**	**$17 102 865**	**$91 392 770**
Proceeds (bioplastics, export)	**$14 555 226**	**$45 259 457**	**$43 449 079**	**$41 711 116**	**$40 042 671**	**$185 017 549**
Proceeds (Gluten, internal market)	**$486 013**	**$786 265**	**$786 265**	**$786 265**	**$786 265**	**$3 631 072**
Proceeds (Corn germ oil, internal market)	**$538 863**	**$871 765**	**$871 765**	**$871 765**	**$871 765**	**$4 025 922**
Proceeds (feed product, internal market)	**$509 847**	**$824 824**	**$824 824**	**$824 824**	**$824 824**	**$3 809 141**
PROCEEDS, including:	**$34 675 535**	**$67 073 348**	**$64 489 728**	**$62 009 453**	**$59 628 389**	**$287 876 453**
Proceeds in Ukraine	*$20 120 309*	*$21 813 891*	*$21 040 649*	*$20 298 337*	*$19 585 718*	*$102 858 904*
Proceeds from export	*$14 555 226*	*$45 259 457*	*$43 449 079*	*$41 711 116*	*$40 042 671*	*$185 017 549*

7.3. Profit generation under the Project

For the entire period of the Project functioning, the total amount of net profit is planned in the amount of **$95 728 512.**

Table 22. Profit and loss statement for the Project

Project period	2021 year	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Sales (Gross profit)	**$0**	**$44 214 367**	**$66 700 071**	**$64 131 382**	**$61 665 441**	**$59 298 138**	**$296 009 399**
Internal market	**$0**	**$21 974 024**	**$21 748 018**	**$20 977 412**	**$20 237 629**	**$19 527 438**	**$104 464 522**
"POLYSTARCH" Україна	*$0*	*$20 232 397*	*$19 265 165*	*$18 494 559*	*$17 754 776*	*$17 044 585*	*$92 791 483*
Gluten	*$0*	*$551 535*	*$786 265*	*$786 265*	*$786 265*	*$786 265*	*$3 696 594*
Corn germ oil	*$0*	*$611 510*	*$871 765*	*$871 765*	*$871 765*	*$871 765*	*$4 098 569*
Feed product	*$0*	*$578 582*	*$824 824*	*$824 824*	*$824 824*	*$824 824*	*$3 877 876*
Export	**$0**	**$22 240 343**	**$44 952 053**	**$43 153 971**	**$41 427 812**	**$39 770 699**	**$191 544 877**
"POLYSTARCH" export	*$0*	*$22 240 343*	*$44 952 053*	*$43 153 971*	*$41 427 812*	*$39 770 699*	*$191 544 877*
VAT	**$0**	**$3 662 337**	**$3 624 670**	**$3 496 235**	**$3 372 938**	**$3 254 573**	**$17 410 754**
VAT	$0	$3 662 337	$3 624 670	$3 496 235	$3 372 938	$3 254 573	$17 410 754
VAT export	$0	$0	$0	$0	$0	$0	$0
Net gross profit	**$0**	**$40 552 029**	**$63 075 401**	**$60 635 147**	**$58 292 503**	**$56 043 565**	**$278 598 645**
Cost of products sold	**$124 028**	**$20 076 646**	**$28 418 017**	**$28 482 934**	**$28 501 429**	**$28 493 891**	**$134 096 944**
Corn "in storage"	$9 437	$2 813 189	$3 957 444	$4 020 470	$4 038 427	$4 031 108	**$18 870 073**
Sulfur	$7	$1 748	$2 492	$2 492	$2 492	$2 492	**$11 724**
Electricity for starch production + osmosis	$826	$220 086	$313 753	$313 753	$313 753	$313 753	**$1 475 923**
Gas for starch production	$362	$96 507	$137 580	$137 580	$137 580	$137 580	**$647 187**
Modifier purchase	$10 628	$2 832 827	$4 038 462	$4 038 462	$4 038 462	$4 038 462	**$18 997 301**
PLA purchase	$45 344	$12 086 730	$17 230 769	$17 230 769	$17 230 769	$17 230 769	**$81 055 151**
Electricity for polymerization	$1 852	$493 621	$703 704	$703 704	$703 704	$703 704	**$3 310 288**
Salary of production personnel	$21 312	$255 744	$255 744	$255 744	$255 744	$255 744	**$1 300 032**
Salary of elevator production personnel	$8 014	$96 170	$96 170	$96 170	$96 170	$96 170	**$488 866**
Salary of starch production personnel	$11 433	$365 856	$548 784	$548 784	$548 784	$548 784	**$2 572 425**
Salary of bioplastic production personnel	$1 832	$58 608	$87 912	$87 912	$87 912	$87 912	**$412 088**
Unified social tax from the salary of production personnel	$9 370	$170 803	$217 494	$217 494	$217 494	$217 494	**$1 050 150**
Overhead production costs	$3 612	$584 757	$827 709	$829 600	$830 139	$829 919	**$3 905 736**

Project period	2021 year	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Gross Profit (Loss)	-$124 028	$20 475 383	$34 657 385	$32 152 213	$29 791 074	$27 549 674	**$144 501 701**
Salary of administration personnel	$153 846	$167 832	$167 832	$167 832	$167 832	$167 832	**$993 006**
Unified social tax from the salary of administration personnel	$33 846	$36 923	$36 923	$36 923	$36 923	$36 923	**$218 461**
Salary of general production personnel	$14 013	$168 152	$168 152	$168 152	$168 152	$168 152	**$854 771**
Unified social tax from the salary of general production personnel	$3 083	$36 993	$36 993	$36 993	$36 993	$36 993	**$188 050**
Bonuses for personnel	$0	$442 144	$667 001	$641 314	$616 654	$592 981	**$2 960 094**
Unified social tax from bonuses for personnel	$0	$97 272	$146 740	$141 089	$135 664	$130 456	**$651 221**
Advertising expenses	$0	$1 105 359	$1 667 502	$1 603 285	$1 541 636	$1 482 453	**$7 400 235**
Other general production expenses	$6 576	$442 626	$626 183	$625 570	$624 106	$622 194	**$2 947 256**
EBITDA	**-$335 391**	**$17 978 082**	**$31 140 059**	**$28 731 055**	**$26 463 114**	**$24 311 689**	**$128 288 607**
Depreciation	$41 667	$2 303 679	$2 303 679	$2 303 679	$2 303 679	$2 290 137	**$11 546 520**
EBIT	-$377 058	$15 674 403	$28 836 380	$26 427 376	$24 159 435	$22 021 552	**$116 742 087**
Equity income	$0	$0	$0	$0	$0	$0	**$0**
Financial income	$0	$0	$0	$0	$0	$0	**$0**
Financial expenses	$0	$0	$0	$0	$0	$0	**$0**
Equity expenses	$0	$0	$0	$0	$0	$0	**$0**
Other expenses	$0	$0	$0	$0	$0	$0	**$0**
Profit before taxation	**-$377 058**	**$15 674 403**	**$28 836 380**	**$26 427 376**	**$24 159 435**	**$22 021 552**	**$116 742 087**
Income tax (estimated)	-$67 870	$2 821 393	$5 190 548	$4 756 928	$4 348 698	$3 963 879	**$21 013 576**
cumulatively	-$67 870	$454 355	$419 143	$383 544	$350 039	$318 465	**$318 465**
Income tax (before payment)	$0	$2 753 522	$5 190 548	$4 756 928	$4 348 698	$3 963 879	**$21 013 576**
Net Profit / Loss	**-$377 058**	**$12 920 881**	**$23 645 831**	**$21 670 449**	**$19 810 736**	**$18 057 672**	**$95 728 512**

7.4. Cash Flow Forecast

Cash flows are expected to increase during the implementation of this Project.

Proceeds

The proceeds under the Project are projected for the following items:

• receipts of investment funds;

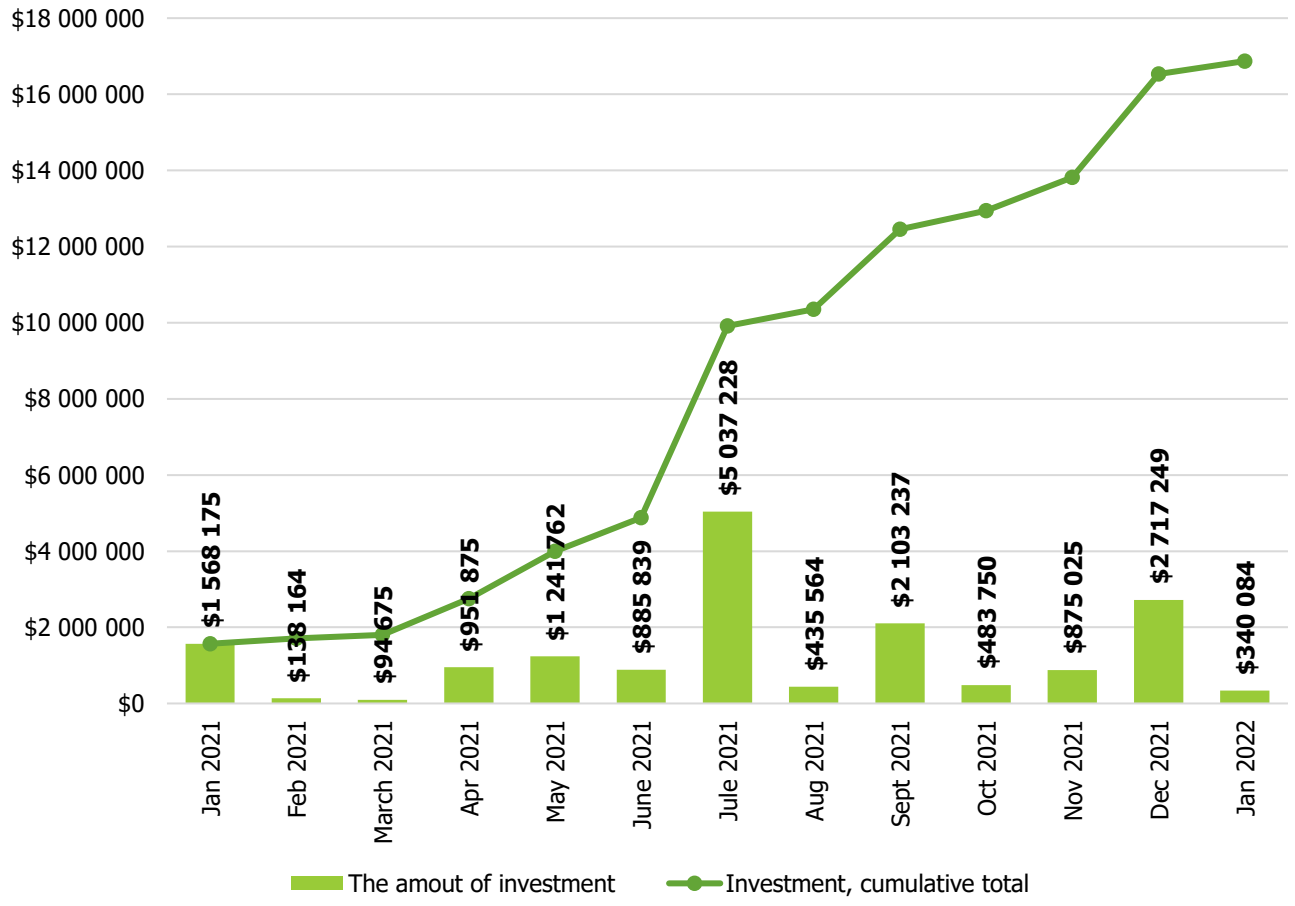
• receipts of own funds

• proceeds from the sale of finished products.

Own and investment funds shall be received in accordance with the schedule for the acquisition and/or creation of the Project assets. The total amount invested makes **$17 643 932.**

Investment is planned for 13 months starting from January 2021. A detailed schedule for investment is presented on the chart.

Fig. 15. Monthly Project financing schedule.



The product sales shall be carried out in accordance with the schedule presented in clause 7.2 and for the forecast period, taking into account the delay in receipt of funds for shipped products, is **$287 876 453**.

Payments

Project payments are represented by operating expenses, tax payments and CAPEX expenses (investment expenses).

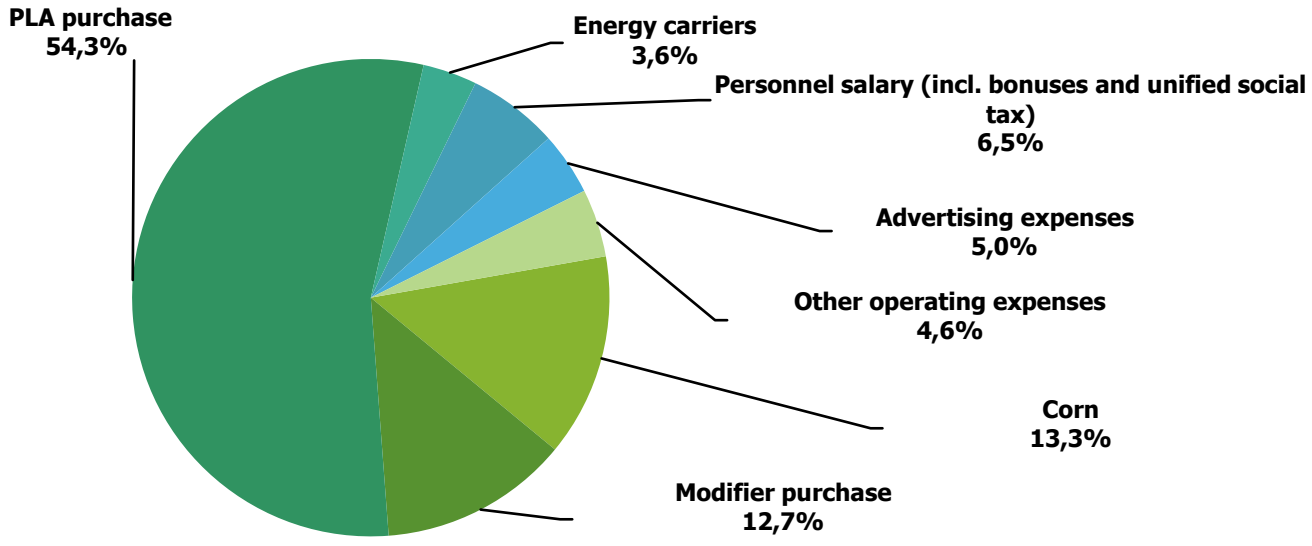
The total amount of operating expenses for the products manufacturing makes **$151 651 372**.

Table 23. Operating expenses under the Project

Project expenses	Total for the period	Share in total expenses	Share in net gross profit
Corn	$23 877 068	13,32%	8,57%
Sulfur	$14 069	0,01%	0,01%
Electricity for starch production + osmosis	$1 771 108	0,99%	0,64%
Gas for starch production	$776 625	0,43%	0,28%
Modifier purchase	$22 796 761	12,72%	8,18%
PLA purchase	$97 266 181	54,26%	34,91%
Electricity for polymerization	$3 972 346	2,22%	1,43%
Salary of production personnel (with Unified social tax)	$1 586 039	0,88%	0,57%
Salary of elevator production personnel (with Unified social tax)	$596 417	0,33%	0,21%
Salary of starch production personnel (with Unified social tax)	$3 138 359	1,75%	1,13%
Salary of bioplastic production personnel (with Unified social tax)	$502 747	0,28%	0,18%
Overhead production costs	$4 686 883	2,61%	1,68%
Salary of administration personnel (with Unified social tax)	$1 211 467	0,68%	0,43%
Salary of general production personnel (with Unified social tax)	$1 042 821	0,58%	0,37%
Personnel bonuses (with Unified social tax)	$3 611 315	2,01%	1,30%
Advertising expenses	$8 880 282	4,95%	3,19%
Other general production expenses	$3 536 707	1,97%	1,27%
Total operating expenses	**$179 267 193**	**100,0%**	**64,35%**

Projected structure of the operating costs under the Project is presented in the diagram below:

Fig. 16. Structure of the operating expenses.



The total amount of investment expenses for the Project for the entire period is **$16 304 899.**

Table 24 . Total amount of investment expenses (CAPEX) for the Project

Investments (CAPEX)	$16 304 899
Acquisition of a land plot with premises	**$1 500 000**
Design work, EIA and product certification	**$187 407**
Polymerization technology	**$2 000 000**
Preparation of industrial premises and site for engineering networks	**$390 000**
Administrative and other premises	**$150 000**
Arrangement of roads and territory	**$150 000**
Construction work on the elevator complex	**$130 000**
Construction of auxiliary structures	**$140 741**
Purchase of equipment for starch production (excluding duties and VAT)	**$4 868 281**
Delivery of equipment for starch production (payment of duty)	**$243 414**
Delivery of equipment for starch plant	**$486 828**
Payment of VAT on equipment for starch plant	**$1 022 339**
Installation work on starch production	**$685 403**
Commissioning work on starch production	**$306 702**
Acquisition of equipment for modification of raw starch	**$595 200**
Installation work on the equipment of modification of raw starch	**$131 520**
Adjustment work (modification of raw starch)	**$29 760**
Purchase of polymerization equipment (including laboratory input / output control)	**$637 000**
Installation work on polymerization equipment	**$90 000**
Commissioning work on polymerization equipment	**$30 000**
Purchase of equipment for an elevator (including an elevator laboratory)	**$1 194 628**
Installation work on the elevator	**$325 892**
Commissioning work on the elevator	**$49 055**
Purchase and installation of additional equipment	**$358 904**
Well	**$25 926**
Purchase of loading equipment	**$36 000**
Purchase of tools, furniture, inventory	**$65 000**
Other investment costs (3%)	**$474 900**

- Tax payments under the Project during the forecast period make ***$23 121 458*** and consist of the following items:
- • Income tax ***$21 013 576***.
- • Payment of value added tax - $ 0 (taking into account that 63.2% of proceeds are generated through the sale of products for export, the amount of the budget refund will exceed the amount of tax obligations and at the end of the Project will be ***$11 011 462*** *and the actual amount of paid VAT will be $ 0*).
- • Unified social tax - ***$2 107 882.***

Table 25. Report on cash flow under the Project.

Project period	2021 year	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Cash flows from operating activities	**-$351 120**	**$3 966 250**	**$26 287 159**	**$25 605 376**	**$22 386 559**	**$20 712 923**	**$98 607 147**
PROCEEDS	**$0**	**$34 675 535**	**$69 294 288**	**$68 140 868**	**$64 516 796**	**$62 260 429**	**$298 887 915**
Proceeds in Ukraine	$0	$20 120 309	$21 813 891	$21 040 649	$20 298 337	$19 585 718	**$102 858 904**
Proceeds from export	$0	$14 555 226	$45 259 457	$43 449 079	$41 711 116	$40 042 671	**$185 017 549**
VAT refun	$0	$0	$2 220 940	$3 651 139	$2 507 343	$2 632 040	**$11 011 462**
EXPENSES	**$351 120**	**$30 709 285**	**$43 007 129**	**$42 535 492**	**$42 130 237**	**$41 547 506**	**$200 280 768**
Operating expenses	$304 821	$27 613 771	$37 378 430	$37 346 064	$37 354 464	$37 161 760	**$177 159 311**
Corn "in storage"	$11 324	$4 622 152	$4 729 051	$4 797 899	$4 906 048	$4 810 594	**$23 877 068**
Sulfur	$8	$2 098	$2 991	$2 991	$2 991	$2 991	**$14 069**
Electricity for starch production + osmosis	$991	$264 103	$376 503	$376 503	$376 503	$376 503	**$1 771 108**
Gas for starch production	$434	$115 808	$165 095	$165 095	$165 095	$165 095	**$776 625**
Modifier purchase	$12 753	$3 399 393	$4 846 154	$4 846 154	$4 846 154	$4 846 154	**$22 796 761**
PLA purchase	$54 413	$14 504 076	$20 676 923	$20 676 923	$20 676 923	$20 676 923	**$97 266 181**
Electricity for polymerization	$2 222	$592 346	$844 444	$844 444	$844 444	$844 444	**$3 972 346**
Salary of production personnel	$21 312	$255 744	$255 744	$255 744	$255 744	$255 744	**$1 300 032**
Salary of elevator production personnel	$8 014	$96 170	$96 170	$96 170	$96 170	$96 170	**$488 866**
Salary of starch production personnel	$11 433	$365 856	$548 784	$548 784	$548 784	$548 784	**$2 572 425**
Salary of bioplastic production personnel	$1 832	$58 608	$87 912	$87 912	$87 912	$87 912	**$412 088**
Overhead production costs	$4 335	$701 708	$993 251	$995 520	$996 166	$995 903	**$4 686 883**
Salary of administration personnel	$153 846	$167 832	$167 832	$167 832	$167 832	$167 832	**$993 006**
Salary of general production personnel	$14 013	$168 152	$168 152	$168 152	$168 152	$168 152	**$854 771**
Bonuses for personnel	$0	$442 144	$667 001	$641 314	$616 654	$592 981	**$2 960 094**
Advertising expenses	$0	$1 326 431	$2 001 002	$1 923 941	$1 849 963	$1 778 944	**$8 880 282**
Other general production expenses	$7 892	$531 152	$751 420	$750 685	$748 927	$746 632	**$3 536 707**
Tax payments	$46 299	$3 095 513	$5 628 699	$5 189 427	$4 775 773	$4 385 746	**$23 121 458**
Unified social tax	$46 299	$341 991	$438 151	$432 500	$427 075	$421 867	**$2 107 882**
VAT payable	$0	$0	$0	$0	$0	$0	**$0**
VAT for calculation (cumulative total)	-$2 712 632	-$3 487 776	-$3 651 139	-$2 507 343	-$2 632 040	-$2 718 288	**-$2 718 288**
VAT liabilities	$0	$3 662 337	$3 624 670	$3 496 235	$3 372 938	$3 254 573	**$17 410 754**
VAT credit, incl.	$2 712 632	$4 437 481	$6 008 973	$6 003 578	$6 004 978	$5 972 861	**$31 140 504**
VAT credit on export operations	$0	$2 220 940	$3 888 349	$3 884 859	$3 885 765	$3 864 982	$17 744 894
Income tax	$0	$2 753 522	$5 190 548	$4 756 928	$4 348 698	$3 963 879	**$21 013 576**

Project period	2021 year	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Cash flow from investment activity	**-$16 181 422**	**-$123 476**	**$0**	**$0**	**$0**	**$0**	**-$16 304 899**
PROCEEDS	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Proceeds from assets sale	$0	$0	$0	$0	$0	$0	$0
EXPENSES	**$16 181 422**	**$123 476**	**$0**	**$0**	**$0**	**$0**	**$16 304 899**
Investments	$16 181 422	$123 476	$0	$0	$0	$0	$16 304 899
Acquisition of a land plot with premises	$1 500 000	$0	$0	$0	$0	$0	**$1 500 000**
Design work, EIA and product certification	$97 407	$90 000	$0	$0	$0	$0	**$187 407**
Polymerization technology	$2 000 000	$0	$0	$0	$0	$0	**$2 000 000**
Preparation of industrial premises and site for engineering networks	$390 000	$0	$0	$0	$0	$0	**$390 000**
Administrative and other premises	$150 000	$0	$0	$0	$0	$0	**$150 000**
Arrangement of roads and territory	$150 000	$0	$0	$0	$0	$0	**$150 000**
Construction work on the elevator complex	$130 000	$0	$0	$0	$0	$0	**$130 000**
Construction of auxiliary structures	$140 741	$0	$0	$0	$0	$0	**$140 741**
Purchase of equipment for starch production (excluding duties and VAT)	$4 868 281	$0	$0	$0	$0	$0	**$4 868 281**
Delivery of equipment for starch production (payment of duty)	$243 414	$0	$0	$0	$0	$0	**$243 414**
Delivery of equipment for starch plant	$486 828	$0	$0	$0	$0	$0	**$486 828**
Payment of VAT on equipment for starch plant	$1 022 339	$0	$0	$0	$0	$0	**$1 022 339**
Installation work on starch production	$685 403	$0	$0	$0	$0	$0	**$685 403**
Commissioning work on starch production	$306 702	$0	$0	$0	$0	$0	**$306 702**
Acquisition of equipment for modification of raw starch	$595 200	$0	$0	$0	$0	$0	**$595 200**
Installation work on the equipment of modification of raw starch	$131 520	$0	$0	$0	$0	$0	**$131 520**
Adjustment work (modification of raw starch)	$14 880	$14 880	$0	$0	$0	$0	**$29 760**
Purchase of polymerization equipment (including laboratory input / output control)	$637 000	$0	$0	$0	$0	$0	**$637 000**
Installation work on polymerization equipment	$90 000	$0	$0	$0	$0	$0	**$90 000**
Commissioning work on polymerization equipment	$15 000	$15 000	$0	$0	$0	$0	**$30 000**
Purchase of equipment for an elevator (including an elevator laboratory)	$1 194 628	$0	$0	$0	$0	$0	**$1 194 628**
Installation work on the elevator	$325 892	$0	$0	$0	$0	$0	**$325 892**
Commissioning work on the elevator	$49 055	$0	$0	$0	$0	$0	**$49 055**

Project period	2021 year	2022 year	2023 year	2024 year	2025 year	2026 year	TOTAL
Purchase and installation of additional equipment	$358 904	$0	$0	$0	$0	$0	**$358 904**
Well	$25 926	$0	$0	$0	$0	$0	**$25 926**
Purchase of loading equipment	$36 000	$0	$0	$0	$0	$0	**$36 000**
Purchase of tools, furniture, inventory	$65 000	$0	$0	$0	$0	$0	**$65 000**
Other investment costs (3%)	$471 304	$3 596	$0	$0	$0	$0	**$474 900**
Cash flow from financial activity	**$16 532 542**	**-$2 448 073**	**-$12 084 469**	**$0**	**$0**	**$0**	**$2 000 000**
PROCEEDS	**$16 532 542**	**$1 111 390**	**$0**	**$0**	**$0**	**$0**	**$17 643 932**
Own funds	$2 000 000	$0	$0	$0	$0	$0	**$2 000 000**
Investment funds (on a repayable basis)	$14 532 542	$1 111 390	$0	$0	$0	$0	**$15 643 932**
EXPENSES	**$0**	**$3 559 463**	**$12 084 469**	**$0**	**$0**	**$0**	**$15 643 932**
Payment of dividends	$0	$0	$0	$0	$0	$0	**$0**
Repayment of the loan body	$0	$3 559 463	$12 084 469	$0	$0	$0	**$15 643 932**
Repayment of interest on the loan	$0	$0	$0	$0	$0	$0	**$0**
FUNDS							
At the beginning of the period	**$0**	**$0**	**$1 394 700**	**$15 597 390**	**$41 202 766**	**$63 589 325**	
Aggregate cash flow for the period	**$0**	**$1 394 700**	**$14 202 690**	**$25 605 376**	**$22 386 559**	**$20 712 923**	**$84 302 249**
At the end of the period	**$0**	**$1 394 700**	**$15 597 390**	**$41 202 766**	**$63 589 325**	**$84 302 249**	

7.5. Calculation of the Break-even Point

To ensure a break-even sales volume, that is, the volume at which the cost of production and sale of products will be equal to the proceeds from the sale of products, and the profit will be zero, the Break-even point parameters should be calculated for the Project.

The analysis of the break-even parameters for this Project took place in the context of the following elements:

1. Calculation of the break-even parameters was carried out for the main product - bioplastics.

2. Calculation of the break-even sales volume of bioplastics in physical units - tone;

3. Calculation of the break-even sales volume in monetary units - US dollars.

4. Analysis of the financial security margin, that is, the level of possible reduction in the Project proceeds when the break-even point is reached. The calculation of this indicator is carried out in absolute (monetary units) and relative terms (%).

The following factors influence the formation of the break-even point parameters for this Project:

1. The production and sales of products shall start from February 2022, respectively, the calculation of the break-even point is carried out starting from 2022.

2. Depreciation deductions in different Project periods differ, as a result of which there is a change in the conditionally fixed costs of the Project, which leads to a change in the parameters of the break-even point.

3. The distribution of expenses that are not directly related to the products manufacturing took place taking into account the production structure of the product output.

To ensure a break-even sales volume for individual product groups, that is, the volume at which the cost per unit of product is equal to the amount of income, and the profit is zero, th followig volume of goods for individual product groups should be produced under this Project.

Table 26. Break-even production volume

Indicator	2022	2023	2024	2025	2026
Production, t	20 504	29 231	29 231	29 231	29 231
Average selling price of 1 ton of products	$2 047	$2 087	$2 004	$1 923	$1 846
Net proceeds from sales, USD	$42 335 652	$61 006 357	$58 566 103	$56 223 459	$53 974 520
Conditional variable costs excluding VAT					
Corn "in storage"	$2 245 466	$3 158 801	$3 209 108	$3 223 441	$3 217 599
Sulfur	$1 395	$1 989	$1 989	$1 989	$1 989
Electricity for starch production + osmosis	$175 671	$250 435	$250 435	$250 435	$250 435
Gas for starch production	$96 507	$137 580	$137 580	$137 580	$137 580
Modifier purchase	$2 832 827	$4 038 462	$4 038 462	$4 038 462	$4 038 462
PLA purchase	$12 086 730	$17 230 769	$17 230 769	$17 230 769	$17 230 769

Indicator	2022	2023	2024	2025	2026
Electricity for polymerization	$493 621	$703 704	$703 704	$703 704	$703 704
Salary of production personnel	$255 744	$255 744	$255 744	$255 744	$255 744
Salary of elevator production personnel	$76 762	$76 762	$76 762	$76 762	$76 762
Salary of starch production personnel	$365 856	$548 784	$548 784	$548 784	$548 784
Salary of bioplastic production personnel	$58 608	$87 912	$87 912	$87 912	$87 912
Unified social tax from the personnel salary	$166 534	$213 225	$213 225	$213 225	$213 225
Overhead production costs	$466 748	$660 671	$662 180	$662 610	$662 435
Bonuses for personnel	$352 916	$532 395	$511 892	$492 209	$473 313
Unified social tax from the personnel bonuses	$77 641	$117 127	$112 616	$108 286	$104 129
Advertising expenses	$882 289	$1 330 987	$1 279 729	$1 230 522	$1 183 283
Amount of variable costs per 1 ton	**$1 006**	**$1 004**	**$1 003**	**$1 001**	**$998**
Conditional fixed costs without VAT					
Salary of administration personnel	$133 962	$133 962	$133 962	$133 962	$133 962
Unified social tax from administration personnel salary	$29 472	$29 472	$29 472	$29 472	$29 472
Salary of general production personnel	$134 217	$134 217	$134 217	$134 217	$134 217
Unified social tax from general production personnel salary	$29 528	$29 528	$29 528	$29 528	$29 528
Other general production expenses	$353 301	$499 815	$499 326	$498 156	$496 630
Depreciation	$1 838 779	$1 838 779	$1 838 779	$1 838 779	$1 827 970
Break-even in kind, t	**2 421**	**2 461**	**2 664**	**2 888**	**3 127**

Table 27. Calculation of the minimum weighted average selling price of the products

Indicator	2022	2023	2024	2025	2026
Planned production volume, ton	20 504	29 231	29 231	29 231	29 231
Planned selling price	$2 047	$2 087	$2 004	$1 923	$1 846
Minimum volume	2 421	2 461	2 664	2 888	3 127
Minimum price	**$1 129**	**$1 095**	**$1 094**	**$1 092**	**$1 089**

Table 28. Break-even volume of production

Project period	2022	2023	2024	2025	2026
Net Sales	$42 335 652	$61 006 357	$58 566 103	$56 223 459	$53 974 520
Conditionally variable costs	$20 635 316	$29 345 347	$29 320 892	$29 262 434	$29 186 125
Invested income	$21 700 337	$31 661 010	$29 245 211	$26 961 025	$24 788 395
Conditionally fixed costs	$2 519 259	$2 665 773	$2 665 284	$2 664 114	$2 651 779
Margin profit (loss)	$19 181 078	$28 995 238	$26 579 928	$24 296 911	$22 136 616
Break-even point in monetary terms	$4 914 876	$5 136 573	$5 337 464	$5 555 639	$5 774 013
Financial safety margin	$37 420 776	$55 869 785	$53 228 639	$50 667 820	$48 200 507
Financial safety margin,%	88,4%	91,6%	90,9%	90,1%	89,3%

7.6. Repayment of investment funds and equity participation of the investor

Attraction of investment funds takes place on the basis of repayment of the amount invested in the process of the Project implementation on a gratuitous basis, without paying interest, commissions, and the like.

At that, the period for the funds repayment is determined by the initiator of the Project, that is, funds shall be repaid subject to the availability of conditionally free funds from the Project implementation that are not involved in the operating or any other activities of the enterprise and can be withdrawn from the company's turnover without prejudice to the current level of liquidity and solvency.

According to the projected amount of the Project income and expenses, the following schedule for the funds repayment to the investor was formed:

Table 29. Schedule for funds repayment to investor

Month	2021	2022	2023	TOTAL
Amount of provided investment funds	$15 643 932	$0	$0	**$15 643 932**
Amount of funds repayable at the beginning of the period	$15 643 932	$15 643 932	$12 084 469	**$0**
Repayment of the amount of investment funds	$0	$3 559 463	$12 084 469	**$15 643 932**
Amount of funds repayable at the end of the period	$15 643 932	$12 084 469	$0	**$0**

The equity participation of the investor and the Project initiators shall be determined in the course of negotiations.

8. ANALYSIS OF THE PROJECT EFFICIENCY

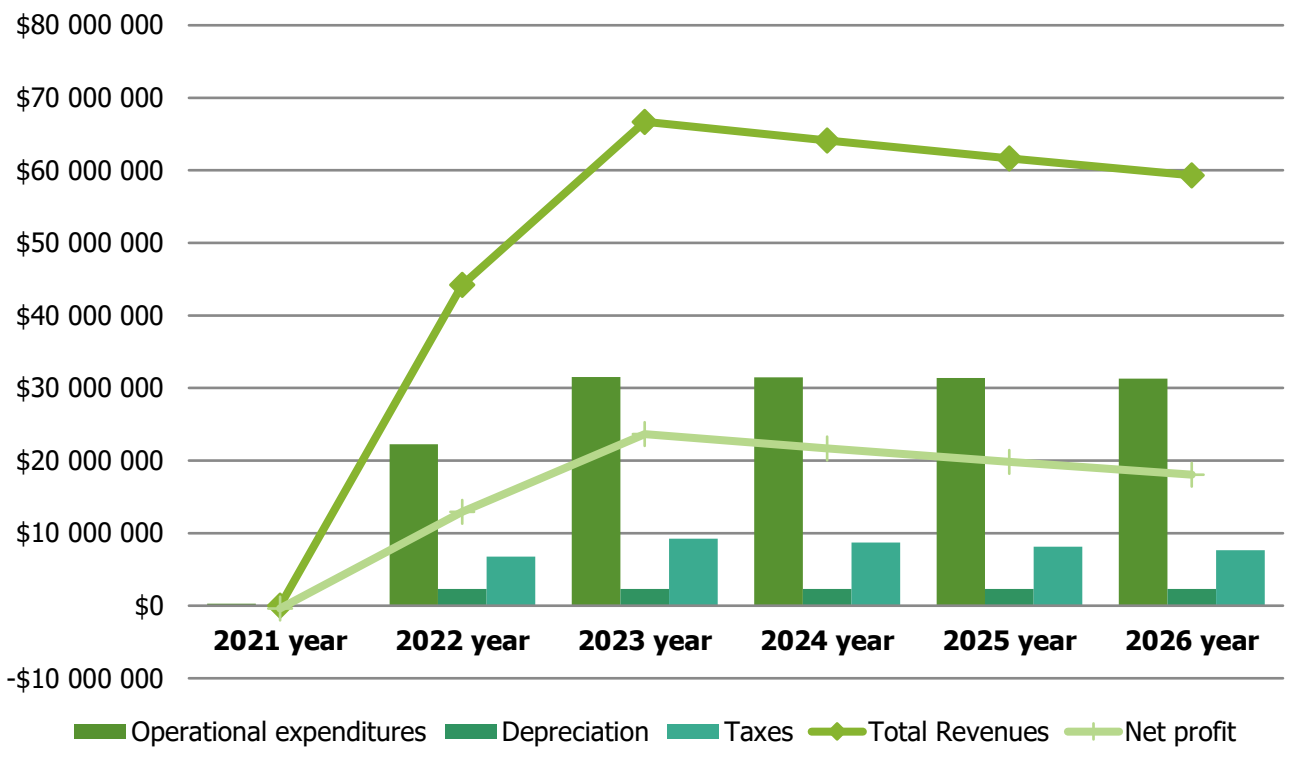
8.1. Analysis of the Project profitability

In accordance with the forecast calculations, data on the predicted amount of profit were obtained and the following data on the profitability of this Project were generated. Calculations for the formation of profit are presented in the form of a table and a graph.

Table 30. Generation of the Project profit

Indicator	2021	2022	2023	2024	2025	2026	TOTAL
Gross sales	$0	$44 214 367	$66 700 071	$64 131 382	$61 665 441	$59 298 138	**$296 009 399**
Operating expenses	$289 093	$22 231 956	$31 497 192	$31 471 592	$31 402 315	$31 310 009	**$148 202 156**
Depreciation	$41 667	$2 303 679	$2 303 679	$2 303 679	$2 303 679	$2 290 137	**$11 546 520**
Taxes	$46 299	$6 757 851	$9 253 369	$8 685 663	$8 148 711	$7 640 319	**$40 532 211**
Net profit	-$377 058	$12 920 881	$23 645 831	$21 670 449	$19 810 736	$18 057 672	**$95 728 512**

Fig. 17. Generation of the Project profit



The table shows the step-by-step formation of the biopolymer production profitability, taking into account the Project parameters.

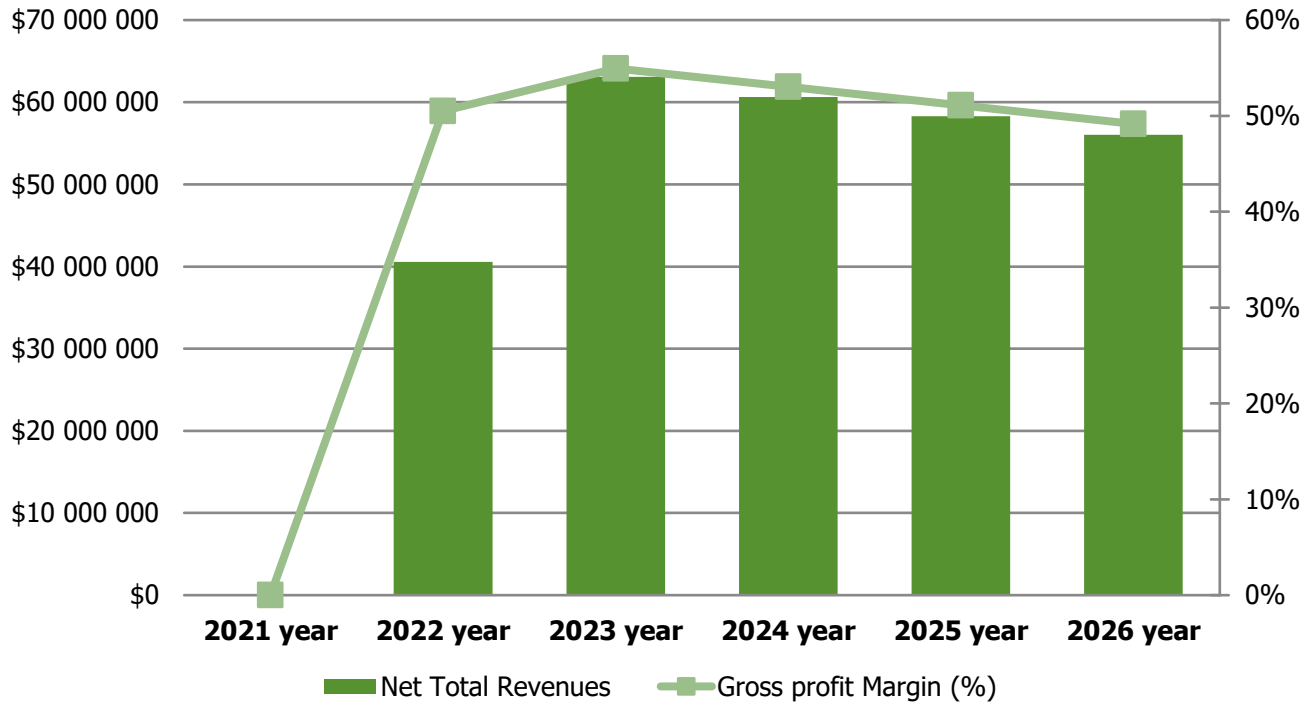
Table 31. Project profitability

Indicator	2021	2022	2023	2024	2025	2026	TOTAL
NET Total Revenues	$0	$40 552 029	$63 075 401	$60 635 147	$58 292 503	$56 043 565	**$278 598 645**
Gross Profit	-$124 028	$20 475 383	$34 657 385	$32 152 213	$29 791 074	$27 549 674	**$144 501 701**
Gross profit Margin, %	**----**	**50%**	**55%**	**53%**	**51%**	**49%**	**51,9%**
EBITDA	-$335 391	$17 978 082	$31 140 059	$28 731 055	$26 463 114	$24 311 689	**$128 288 607**
EBITDA Margin %	**---**	**44%**	**49%**	**47%**	**45%**	**43%**	**46,0%**
EBIT	-$377 058	$15 674 403	$28 836 380	$26 427 376	$24 159 435	$22 021 552	**$116 742 087**
Ordinary Income Margin	**----**	**39%**	**46%**	**44%**	**41%**	**39%**	**41,9%**
Net Profit / Loss	-$377 058	$12 920 881	$23 645 831	$21 670 449	$19 810 736	$18 057 672	**$95 728 512**
Return on sales ,%	**---**	**32%**	**37%**	**36%**	**34%**	**32%**	**34,4%**

The table shows the step-by-step formation of profitability of the Project activity, taking into account various factors.

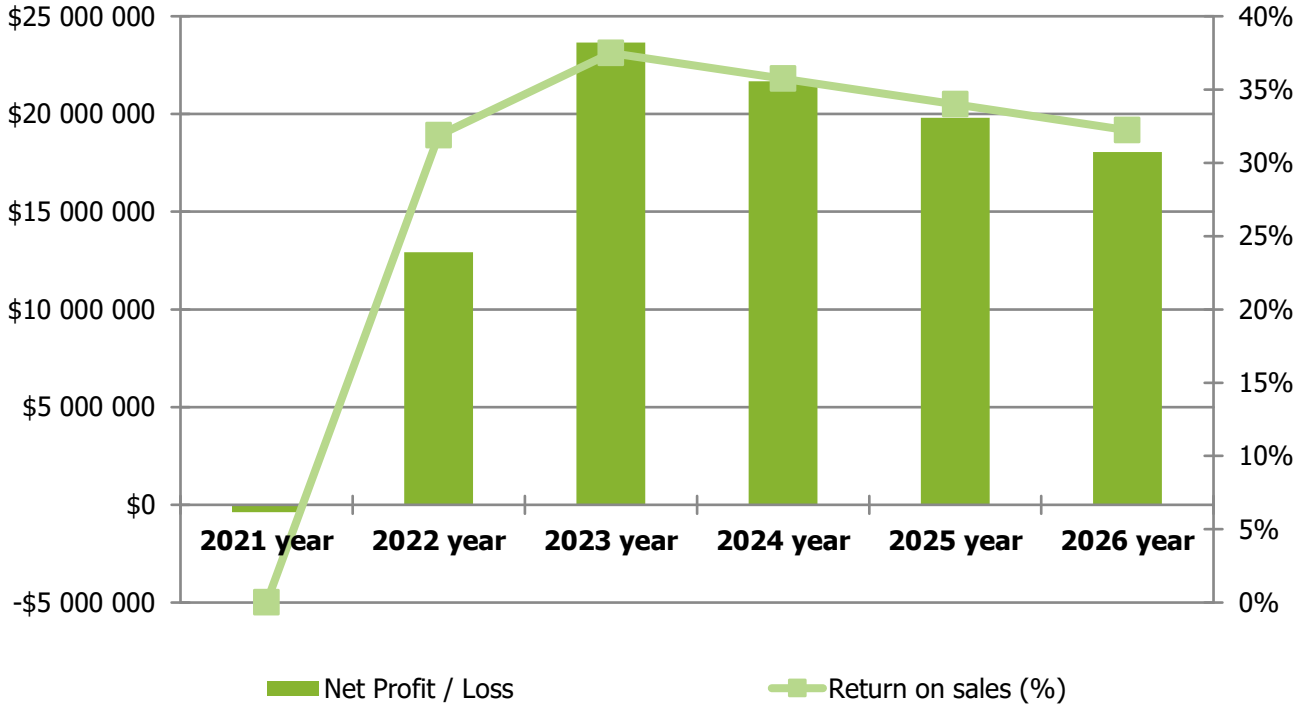
- **Gross profit Margin, %** - gross profitability, shows the profitability of the Project activity, taking into account the cost of production.
- **EBITDA Margin, %** - shows the profitability of the enterprise, taking into account all operating expenses before depreciation and taxes
- **Ordinary Income Margin, %** - shows the profitability of the Project activity, taking into account operating expenses and depreciation deductions before tax payments.
- **Return on sales, %** - profitability of the Project activity for the production of biopolymers for agriculture, taking into account all costs.

Fig. 18. Gross revenue and gross profit margin



Return on sales is used to control not only the cost of the products sold, but also changes in the Project pricing policy and characterizes the operational efficiency of activities. The size of this indicator for the project is **34.4%,** which indicates that each dollar of income will bring **$ 0.344** for the Project**.**

Fig. 19. Net profit and return on sales



8.2. Indicators of investment attractiveness and profitability of the Project (NPV, IRR, DPP, PI and others)

Calculation of discount rate

The discount rate is the rate that a buyer or investor expects to receive from their investment in the Project.

The calculations were made on the basis of 18% discount rate

At this level of discount, the following indicators were obtained that characterize the effectiveness of the Project:

Table 32. Indicators of efficiency

Indicator	Unit of measurement	Value
Payback period from the start of production	months	17,8
Discount payback period from the start of production	months	20,4
Payback period, DPP	months	29,8
Discount payback period, DPP	months	32,4
Project period, PP	months	72,0
Net Present Value - NPV	USD	**$41 787 844**
Internal rate of return, IRR	%	**85,6%**
Profitability index, PI	од.	3,566
Return On Sales, Net Profit Margin - ROS	%	34,4%
Return on investment - ROI	%	543%

The indicators of efficiency are characterized as follows:

Net present value (NPV) of the Project

This indicator, according to the Table, is greater than "0". The received amount of **$41 787 844** of the NPV indicator confirms the profitability of the Project and indicates that all cash receipts corrected to today's value exceed the funds invested in the Project, which indicates the high efficiency of the investments.

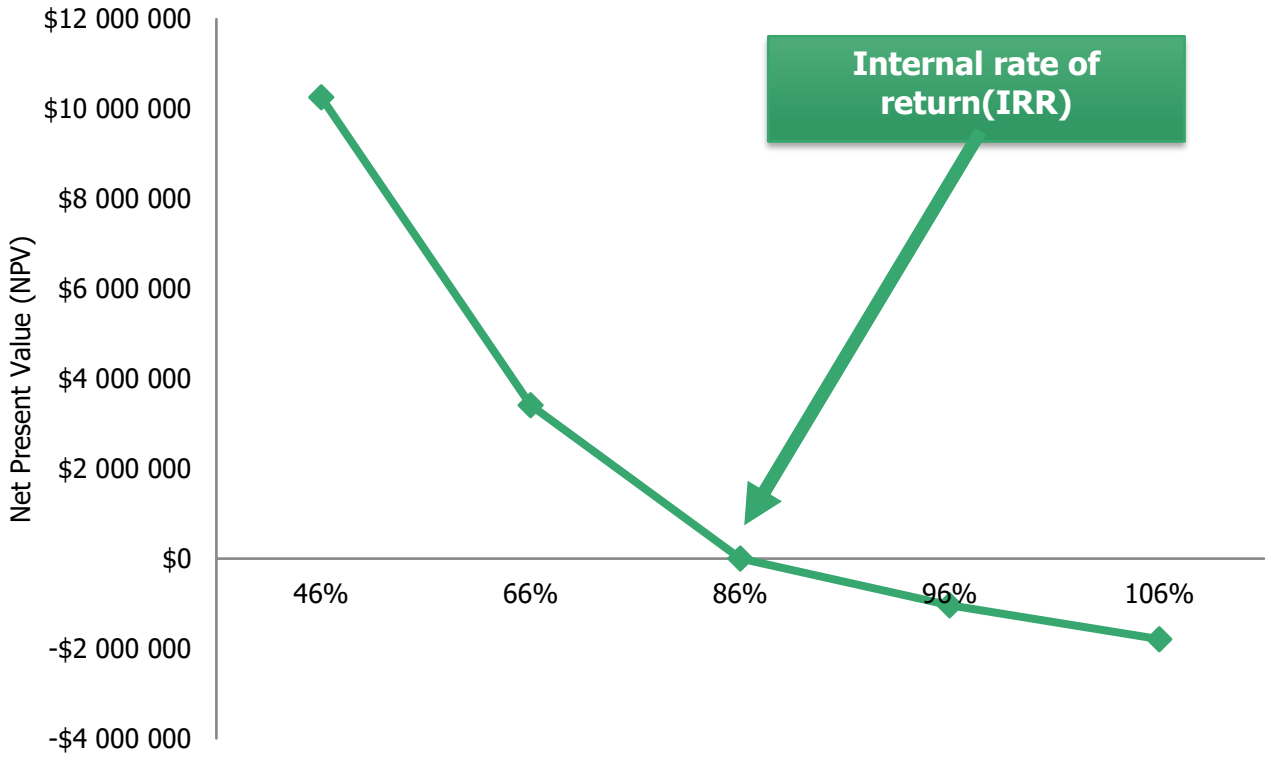
The NPV indicator is the difference between all cash receipts and payments corrected to the current point in time (the moment of the investment project evaluation). It shows the amount of cash that the investor expects to receive from the Project, after the cash receipts pay off their initial investment costs and periodic cash payments associated with the implementation of the Project. Since cash payments are valued in terms of their cost over time and risks, NPV can be interpreted as the value added by the Project. It can also be interpreted as the total profit of the investor for the Project period from making investments in the implementation of this Project.

Internal Rate of Return (IRR) of the Project

Internal rate of return (average return on invested capital provided by this investment project) is 85.6%

At this rate, the present value of the Project cash flows is equal to the present value of the Project costs. The internal rate of return determines the maximum cost of the attracted capital at which the investment project remains profitable. In other words, this is the average return on invested capital provided by this investment project, that is, the efficiency of capital investment in this Project is equal to the investment efficiency of 85.6% in any financial instrument with a uniform income.

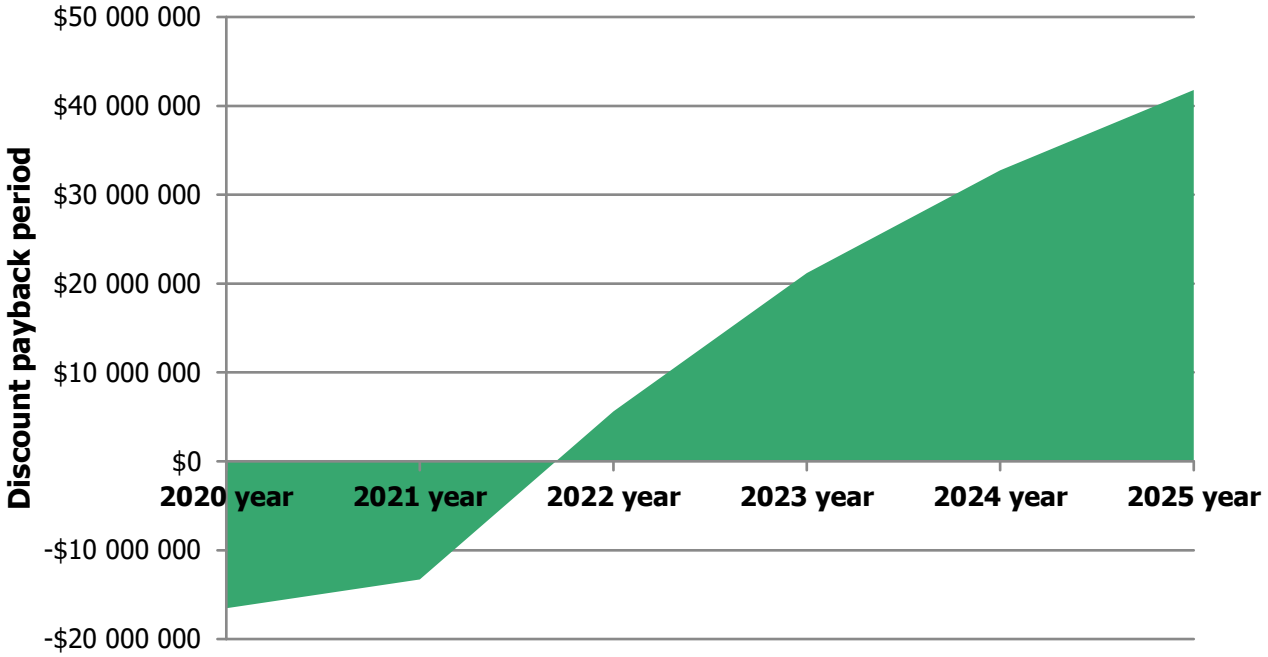
Fig. 20. Internal rate of return



Discounted payback period of the Project

The discounted payback period of the Project is **2 years and 9 months or 33 months**. This means that the Project will fully pay off within the project period, taking into account the discount factor.

Fig. 21. Discounted payback period



Return on investment indicators

For this Project, the return on investment index is **3.566**, which means the following: each monetary unit spent by the company will bring it **3.566** units of discounted cash receipts during the Project implementation.

Return on investment shows the amount of net profit obtained as a result of investment in the Project and makes **543%**. That is, when investing one dollar, the company receives **$ 5.43** of net profit.

8.3. Project development scenarios

During the Project implementation, deviation of the planned indicators included in the Project may deviate from those obtained, on this basis, to determine the possible risks of the Project implementation, three scenarios of the Project's development were considered:

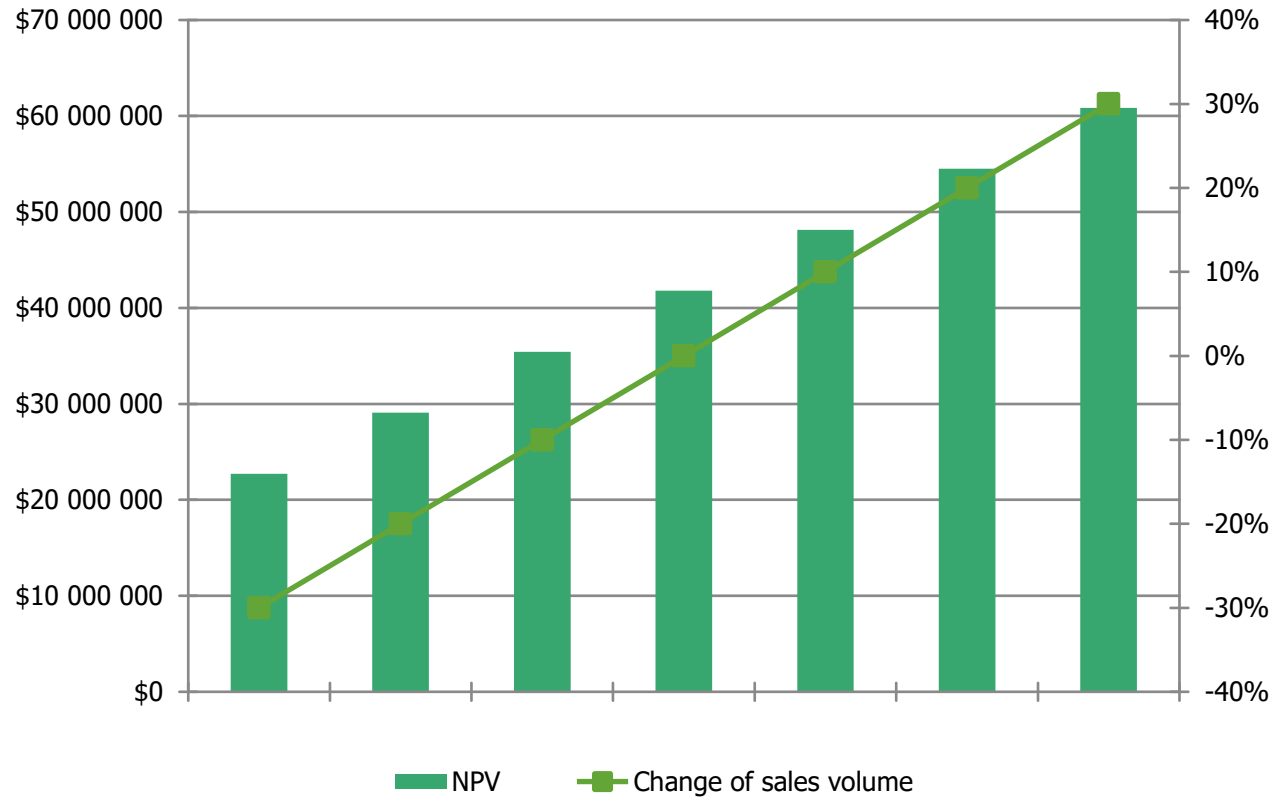
1. Scenario of changes in the volume of the product sales

Table 33. Sensitivity of the Project to changes in the product sales volume

INDICATORS	-30%	-20%	-10%	0%	10%	20%	30%
NPV	$22 718 212	$29 074 756	$35 431 300	**$41 787 844**	$48 144 388	$54 500 932	$60 857 476
IRR	59,1%	68,4%	77,2%	**85,6%**	93,6%	101,3%	108,7%
PI	2,4	2,8	3,2	**3,6**	4,0	4,3	4,7
DPP, years	3,2	3,0	2,8	**2,7**	2,6	2,5	2,5

At that, the correlation between the volume of the Project services and the NPV of the Project is as follows:

Fig. 22. Correlation of NPV with the volume of production

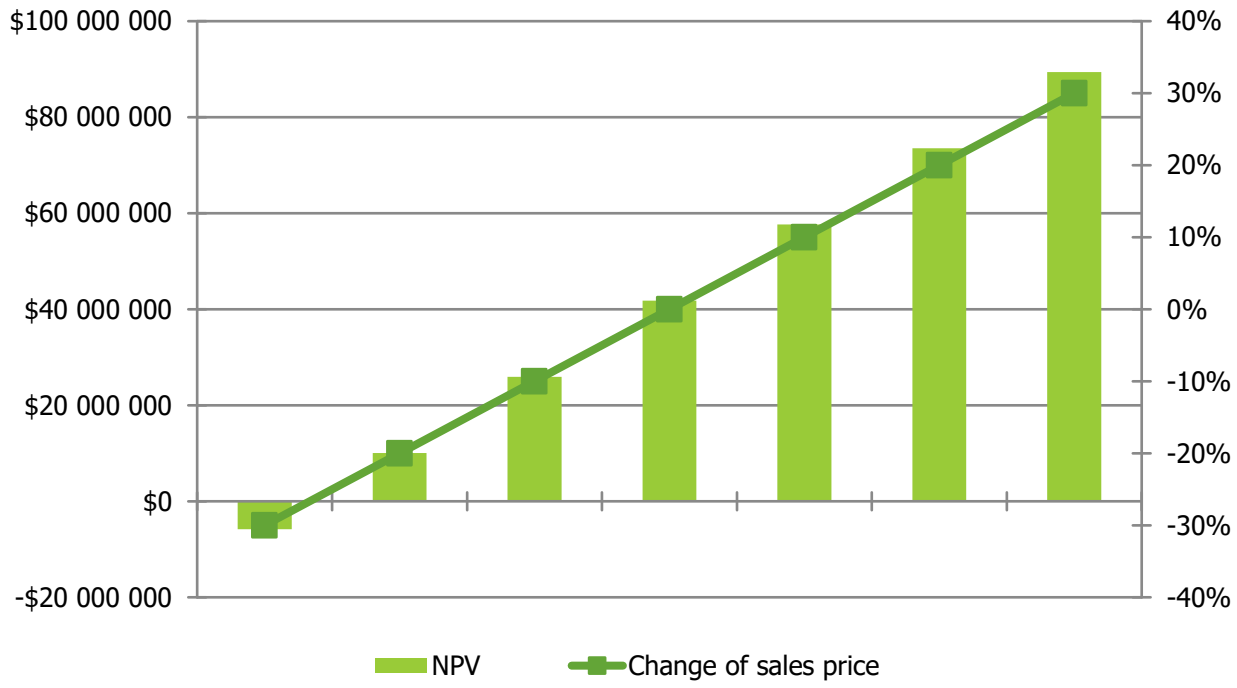


2. Scenario of change in the product selling price

Table 34. Sensitivity of the Project to change in the selling price

INDICATORS	-30%	-20%	-10%	0%	10%	20%	30%
NPV	-$5 831 700	$10 041 481	$25 914 662	**$41 787 844**	$57 661 025	$73 534 207	$89 407 388
IRR	5,3%	36,7%	62,4%	**85,6%**	107,5%	128,5%	149,0%
PI	0,6	1,6	2,6	**3,6**	4,5	5,5	6,5
DPP, years	No payback	4,0	3,1	**2,7**	2,5	2,3	2,2

Fig. 23. Correlation of NPV and selling price of services

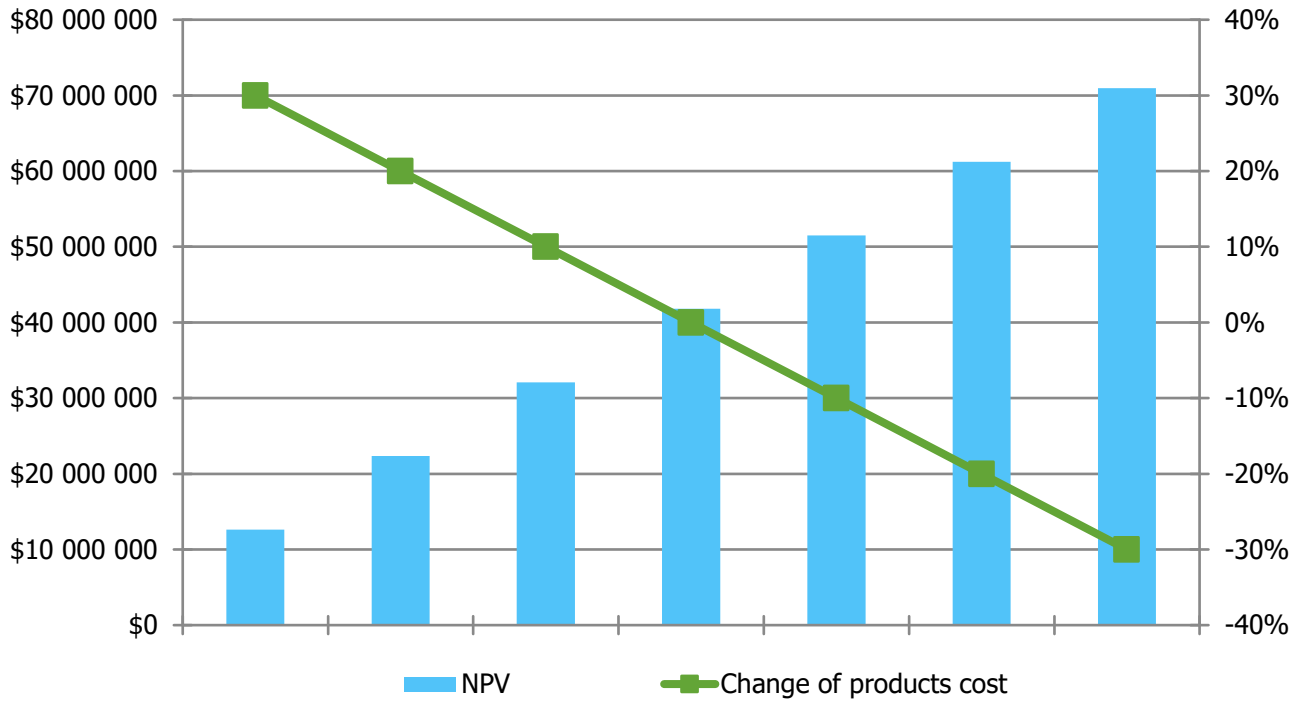


3. Scenario of change in prime cost

Table 35. Sensitivity of the Project to changes in prime cost

INDICATORS	30%	20%	10%	0%	-10%	-20%	-30%
NPV	$12 634 373	$22 352 197	$32 070 020	**$41 787 844**	$51 505 667	$61 223 491	$70 941 314
IRR	40,1%	55,7%	70,8%	**85,6%**	100,2%	114,8%	129,4%
PI	1,8	2,4	3,0	**3,6**	4,2	4,8	5,4
DPP, years	3,8	3,3	2,9	**2,7**	2,5	2,4	2,3

Fig. 24. Correlation of NPV and selling price of services



9. ANALYSIS OF THE PROJECT RISKS

9.1. Factor analysis of the Project risks

For a qualitative assessment of risks, a 10-point scale is used..

Table 36. Characteristics of risk components

Level of impact			Probability of occurrence		
5-point			10-point		
5	Very high	80-100% investments	Always	Every day	10
			Almost inevitable	More often than once a month	9
4	High	60-79% investments	Very often	More often than once a year, and less often than once a month	8
			Often	More often than once every 2 years, and less often than once a year	7
3	Average	40-59% investments	Possible	More often than once every 3 years, and less often than once a year	6
			Accident, often caused by human factor	1 time in 3 years, and more often than 1 time in 5 years	5
2	Low	20-39% investments	From time to time	1 time in 5 years, and more often than 1 time in 7 years	4
			Very rare	1 time in 7 years, and less often than 1 time in 5 years	3
1	Very low	0-19% investments	Almost impossible	Less than once every 7 years	2
			Impossible	Less than once every 10 years	1

Among the risks associated with the implementation of the Project, the following are worth mentioning:

1. Risk of loss of financial profit;
2. Resource risk;
3. Risk of implementation;
4. Bureaucratic and administrative risks;
5. Financial risks;
6. Technological risks;
7. Legal risks

*Table 37. **Основні види ризиків для проєкту***

№	Risk category	Description	Possibility (from 1 to 10)	Level of impact (from 1 to 5)	Risk level assessment
1	Risk of loss of financial profit	These are the risks of the indirect (incidental) financial damage (unearned profit) as a result of failure to implement any measure (for example, failure to achieve the planned sales volume) or, if we consider the global option, the termination of the economic activity of the enterprise.	**4**	**4**	**16**
2	Resource risk	For this project, the resource risk lies in an increase in raw material prices due to an increase in the volume of grain exports abroad and a shortage of raw materials in the domestic market. Another factor may be the deterioration of the quality of raw materials (especially high humidity or the presence of a large amount of impurities). In addition, this risk may arise in the event of an increase in the cost of labor.	**4**	**2**	**8**
3	Risk of implementation	This type of risk is associated with the fact that during the implementation of the Project or the implementation of the enterprise strategy, the final planned results will not be achieved: • Failure to select personnel with the necessary qualifications, who would know the specifics of the market and who have experience in it. • Failure to establish effective communication and attract potential customers. • Failure to fulfill (low quality, untimely fulfillment) obligations by the company that is responsible for the construction of the complex or its contractors. • Errors in design, carrying out geodetic works, etc.	**5**	**5**	**25**
4	Bureaucratic and administrative risks	Such risks arise as a result of the adoption by the competent authority of legally significant decisions of a regulatory nature (Verkhovna Rada of Ukraine, Cabinet of Ministers of Ukraine, customs control bodies, local councils), which directly or indirectly affect negatively the activities of the enterprise, as well as unpredictable activities of state authorities and / or individual officials relating the adoption by them of decisions, the direct or indirect consequence of which may be a negative impact on the activities of the enterprise. The consequence of these risks may be an increase in the time required for obtaining special permits, certification, complications in the further activities of the enterprise, restrictions on carrying out a specific type of activity, an increase in gross costs, changes in business procedures, and the need for additional special permits.	**6**	**3**	**18**
5	Financial risks	This category of risks includes risks that may entail the possibility of non-return of the attracted capital within the planned time frame and at the planned cost of investments. These include:	**7**	**3**	**21**

		1. The emergence of uncertain circumstances that may lead to an increase in the cost of the Project; 2. Increase in the cost of borrowed capital; 3. Changes in the clients' solvency, which may lead to the impossibility of timely and full settlement of their obligations; 4. Fluctuations in prices for manufactured products, as well as for raw materials. This type of risk is at a medium level.			
6	Technological risks	This includes the risk of man-made accidents in the event of force majeure, physical wear and tear of production equipment, incomplete or untimely execution of technological operations, which leads to a loss of volume and quality of products and, accordingly, a loss of part of the income. Such risks are minimal for this Project, since it is planned to purchase new and high-performance equipment.	**5**	**3**	**15**
7	Legal risks	The existing shortcomings of the Ukrainian legal system and Ukrainian legislation lead to the atmosphere of uncertainty in the field of commercial activities - a legal type of risk arises. These disadvantages include: 1. Development of the Ukrainian legal system and, as a result, the discrepancy between laws, decrees of the head of the state and orders, decisions, decrees and other acts of the government, ministries and local authorities. In addition, a number of fundamental laws were only recently enacted, and by-laws for enforcement of individual laws are often lacking; 2. The inconsistency of the courts in the implementation of the principle of uniformity of judicial and arbitration practice and the relative degree of inexperience of judges and courts in interpreting certain norms of legislation.These deficiencies may affect adversely the ability of the future enterprise to enforce the rights, as well as defend itself in the event of claims from others. Taking into account the current transformations in the country, the variability of the regulatory and legal framework, this risk is at a medium level.	**5**	**2**	**10**

The results of a qualitative risk assessment are presented in the table below, where all the risks that were previously analyzed in accordance with the risk level assessment are systematized.

Table 38. Risk level assessment

	Possibility					
Level of impact	Very high (5)			**3**		
	High (4)		**1**			
	Medium (3)			**4,6**	**5**	
	Low (2)		**2**	**7**		
	Very low (1)					
		Very low (1-2)	Low (3-4)	Medium (5-6)	High (7-8)	Very high (9-10)

According to the analysis, implementation and financial risks are serious risks under the Project.

9.2. Risk mitigation strategy

In an unstable economic situation, in order to reduce the riskiness of the project, the enterprise can create a commercial risk fund, to which 5-10% of the company's net profit shall be deducted. An alternative method of risk reduction is cooperation with insurance companies.

To prevent risks, decisions can also be made on the application of the following measures in the context of the identified risk groups:

Risk of loss of financial benefits and consumer risks

- Regular quality control of produced biopolymers;
- Continuous marketing research in order to identify new ways to attract customers, selection of forms of advertising policy;
- Setting up long-term contractual relations with wholesale companies, distributors, chains;
- Conclusion of contracts for the implementation of wholesale supplies of raw materials;
- Conducting a systematic monitoring of the business activity of the enterprise, as well as an independent conduct of a comprehensive assessment of the strengths and weaknesses of the enterprise and its structural divisions

Resource risk

- Conclusion of long-term contracts for the supply of necessary materials, components and other goods at stable prices;
- Working with suppliers of necessary raw materials directly, reducing the number of intermediaries between them and the enterprise.
- The diversification of supply channels of polylactic acid and the signing of long-term contacts.
- Breakdown of the production process into several structurally separate divisions, which makes it possible to attract raw materials at different stages of processing. For example: using already peeled and dried corn instead of buying corn from the field, or purchasing ready-made corn starch instead of raw starch of own production. Usually, such measures can lead to an increase in the cost of the final product, but they reduce the risks associated with the need to find the main raw material for the production of biopolymer.

Implementation risk

- Brand development and testing for success among target buyers;
- Setting up personal contacts with wholesale buyers, distributors, chains, state and regional authorities;
- Conclusion of contracts for the purchase of products (both wholesale and retail)
- Cooperation with other countries to establish wholesale supplies of products.

Bureaucratic and administrative risks

Using the available administrative resource to resolve quickly the issues regarding obtaining the necessary permits, licenses for activities, both on the territory of Ukraine, and for the implementation of export-import operations.

Legal risks

- Engaging highly qualified lawyers from the economic, corporate and foreign economic branches of law;
- Study of legislative possibilities for optimization of enterprise costs with their subsequent use;
- Close cooperation with tax and customs authorities.

Technological risks

- Reservation of funds in case of unforeseen equipment breakdowns;
- Equipment insurance;
- Analysis and diagnostics of innovative technologies.

9.3. SWOT-analysis

Strong points (S)	POssibilities (O)
• Use in projects of modern innovative technologies and approaches to production. • Use for the production of constructively simple and affordable technological equipment. • Weighted assortment policy taking into account current trends in the biopolymer market. • Use of available raw materials of Ukrainian origin • Assortment increasing, improvement product and price policy with taking to account of the specifics of some regions. • Involvement of the big number of clients and creating of client base. • Costs optimization and tax planning.	• Introduction of restrictions on the use of plastic for the production of certain types of goods • Increasing trend towards a decrease in the use of plastics based on gas and oil. • Strengthening the competitive position of the Project, expanding the client base by creating new types of products. • Development of new product markets. • Increasing the market value of the companies involved in the Project implementation. • Steadily growing demand for traditional polymers substitutes.
Weak points (W)	**External threats (T)**
• High costs at the initial stage of the Project implementation associated with the formation of the required production base. • The use of raw materials, which can be used both for human nutrition, and is included in feed for livestock • Relatively short shelf life of finished products • . Threats of disruption of supplies of raw materials and reagents, in particular modifiers and polylactic acid of appropriate quality.	• Seasonal fluctuations in prices for basic raw materials. • Using by costumers of replacement items • Entering the market of new competitors. • Cheaper prices for products under the Project. • Replacement of biopolymer with substitutes, including with foreign ones. • Impossibility of using biopolymer for the entire range of products made from traditional types of plastics • Increase in the cost of the basic raw material - corn, associated with the expansion of the range of its use.

10. CONCLUSIONS

The Project provides for the creation of the production of biopolymers for thr industrial production of plastic items.

The total cost of the Project is **$17,643,932**, of which:

• ***$2,000,000*** (11.3%) shall be financed from the own funds of the Project initiators

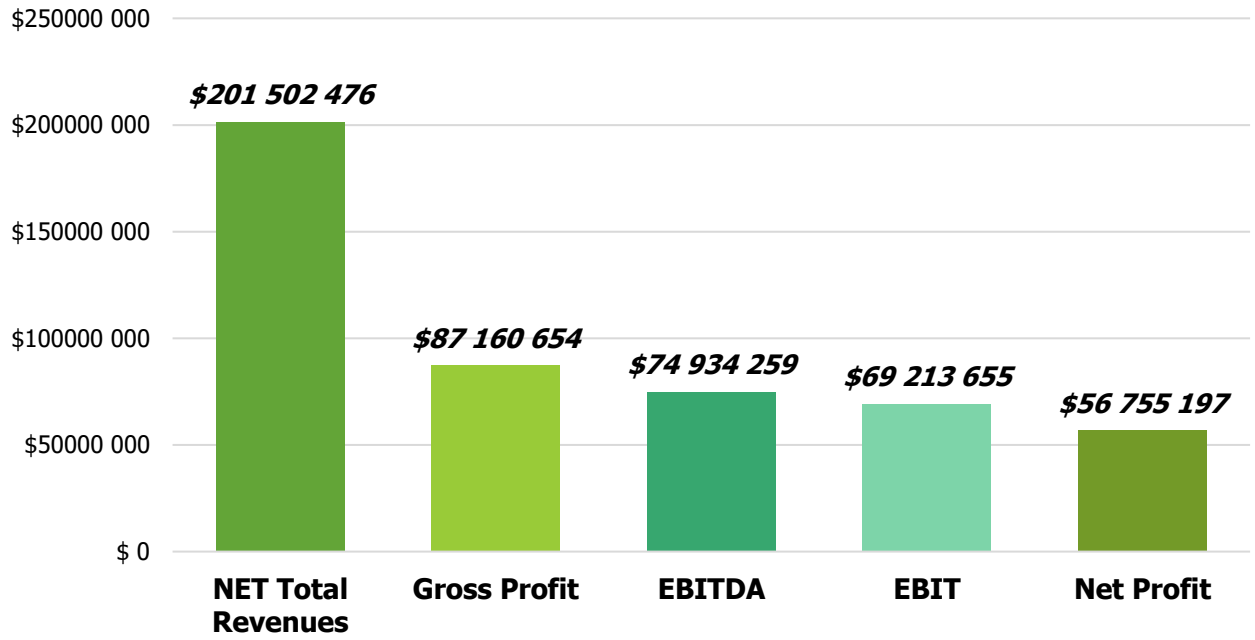
• ***$15,643,932*** (88.7%) shall be financed from the investor funds (on a repayable basis).

The Project is profitable and efficient, which is confirmed by both profitability and efficiency indicators and indicators of investment attractiveness.

The aggregate net profit for the entire period of implementation is - **$95,728,512**.

At that, the total cash flow is **$84,302,249.**

Fig. 25. Forecasted financial results

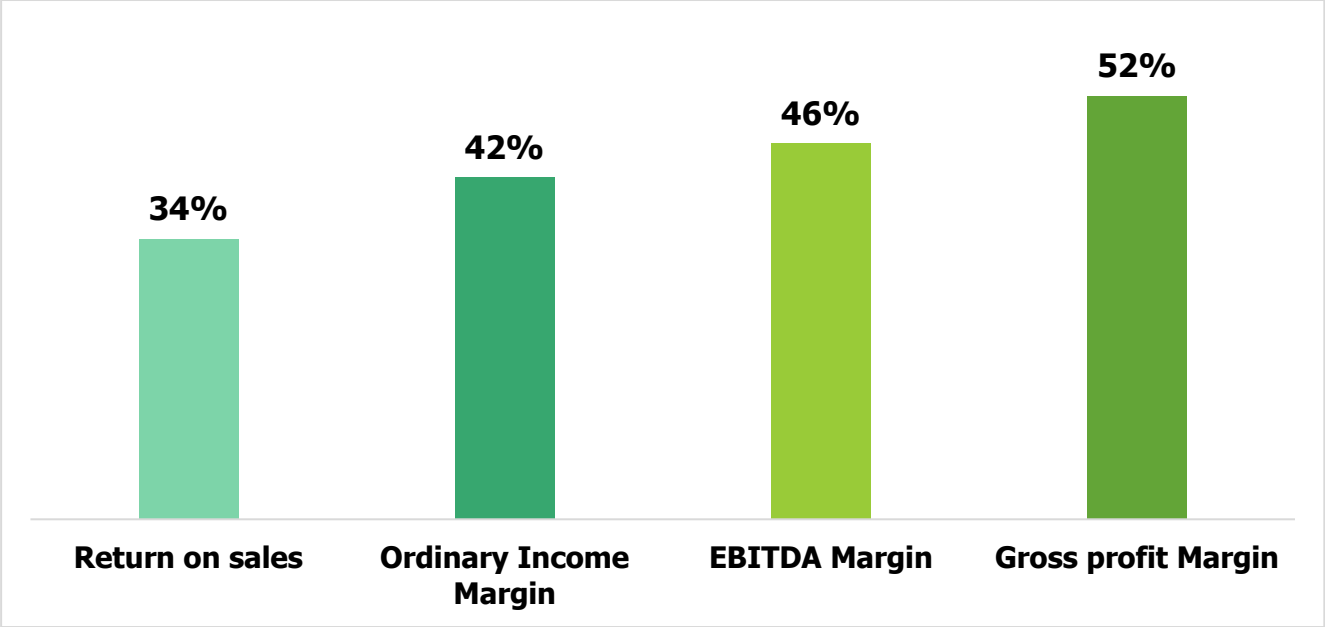


The discount rate for the Project is **18%**. When using this rate, the indicators of investment attractiveness are as follows:

- Net present value (NPV) - **$41 787 844**.
- Investment profitability index (PI) - **3.57**.
- Internal rate of return (IRR) - **85.6%**
- Discounted payback period from the date of investment (DPP) is **2 years and 9 months**.

The return on sales for the Project is **34.4%.** This suggests that every dollar of net income from the product sales under the Project will bring **$ 0.344** of net profit.

Fig. 26. Indicators of the Project profitability



Subject to the observance of the factors specified in the business plan, the Project remains attractive for investment with a decrease in sales by 65%, sales prices for finished products by 26% and an increase in production costs by 43%.

Project efficiency indicators demonstrate the presence of a certain margin of the Project stability, which guarantees a timely return on investment, even if the actual data of the Project implementation deviates from the predicted indicators.

In conditions of significant environmental pollution with plastic waste, which is one of the main sources of pollution, the transition to biotechnology for the creation of biodegradable polymers is highly relevant, and indicators of investment attractiveness indicate the effectiveness of the Project implementation.

THE PROJECT OF INNOVATION-BASED BIOPOLYMER PRODUCTION FACTORY

Project business idea is to create integral complex of biopolymer production with controlled biodegradation period based on innovative technology, with distribution of the final products in Ukraine, Europe and East states.

Annual biopolymer production capacity: up to 30 thd. tons.

Investment plan provides attraction of $17 891 908 investment capital in total amount for creation of the factory.

Forecasted project period is 6 years.

Forecasted financial parameters of investment project make it possible to expect profitability (IRR-based) on the level of at least 87,8%.

Key Investment Parameters

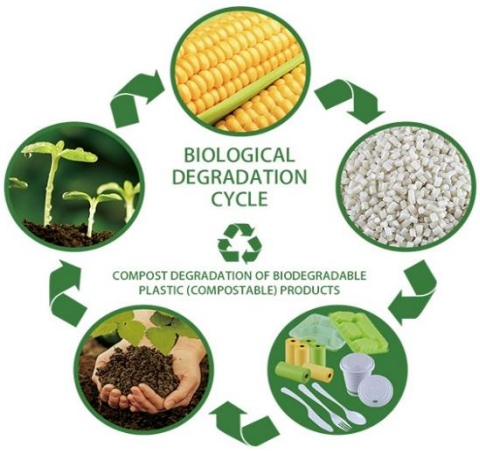
Investment period	**2021 F**
Forecasted period	**6 years**
Time required to put the factory in operation	12 months
Beginning of sales of main products	**January, 2022 F**
Amount of Investment	$17 891 908
Discount payback period (DPP)	**2 years 8 months**
Internal rate of return (IRR)	**87,8 %**

Project Essence

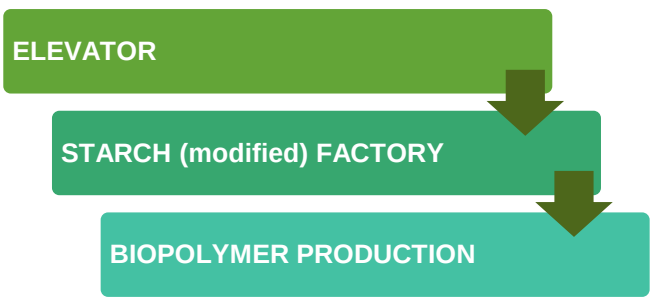
Project Objective: to produce biopolymer with controlled biodegradation period on the basis of production complex to be created according to the project; to get the product with better properties and for the lower price.

Project concept is based on industrial corn processing and production of 100% degradable biopolymer with use of unique triple nano polymerization technology enabling to receive biocompound (or bioplastic) with high physical and mechanical properties.

Biopolymer is a plastic which dissolves in natural environment, provided that biopolymer biodegradation period depends on starch copolymerization level.



Main Structural Elements

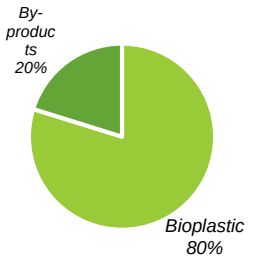


Production and Sales Parameters (for the period of forecast – 6 years)

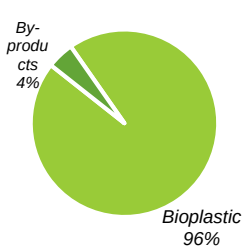
Production, tons	PRODUCTS	Total revenues, $
136 767	BIOPLASTIC	**$287 034 437**
6 221	Gluten	**$3 732 458**
2 759	Corn germ oil	**$4 138 333**
26 103	Fodder	**$3 915 500**

SALES STRUCTURE

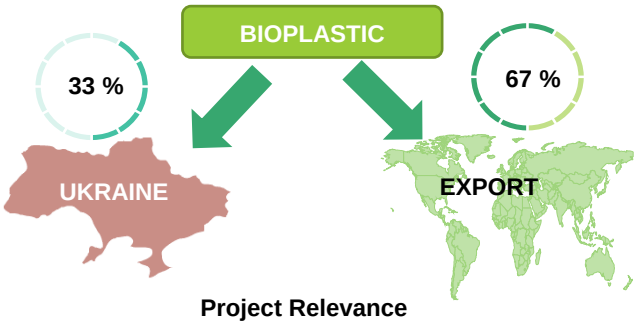
IN UNIT SALES



IN MONEY TERMS



Distribution Channels



Project Relevance

Polymer waste is one of the main problems of the XXIst century.

Each Ukrainian uses about 500 plastic packs annually.

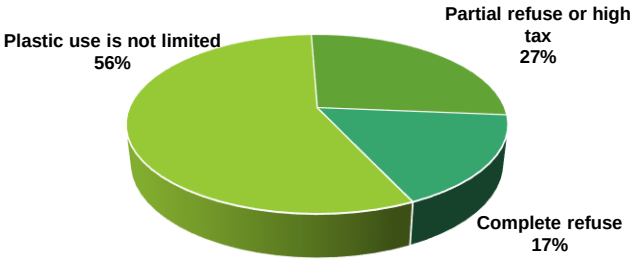
Plastic pack…

IS USED	DEGRADES
12 minutes	Up to 200 years or… **105 120 000 minutes**

Up to 11 mln. tons of household wastes are created in the country each year, and 30% of them are different polymers. In line with that, only slightly more than 1% of plastic is ever recycled.

At the end of 2019 the Law on limitation of plastic pack circulation on the territory of Ukraine No. 2051-1 dd. 18.09.2019 was adopted in the first reading in Ukraine – it is the first step to limit the scope of oil-based plastic utilization on the territory of our country.

Nevertheless, in actual situation complete refuse from plastic is not possible in practice. Only about 44% of 197 states of the world adopted limitations for plastic use:



The only alternative for oil-derived plastic is to use biopolymers enabling manufacture of products with similar physical and chemical properties which decompose in natural environment into carbon dioxide, water, and mineralized salt, within much shorter period.

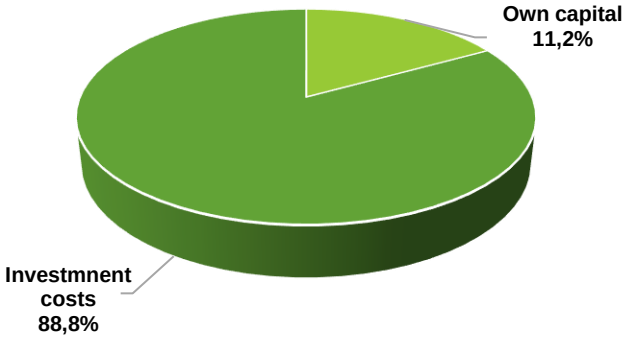
So, project implementation forms the new plastic handling concept in Ukraine: **INSTEAD OF PROHIBITION** of use of plastic which became a part of everyday life, its replacement with ***BIOPLASTIC***, the innovative, environmentally friendly type of material for production of main part of "plastic" products.

Project Investment Directions

Investment Directions	Amount
Land lot, premises and facilities (taking in consideration repairs and design works)	***$2 648 148***
Equipment for starch production	***$7 612 967****
Equipment for starch modification	***$756 480***
Equipment for polymerization	***$757 000***
Elevator equipment	***$1 569 574***
Know-how (polymerization technology)	***$2 000 000***
Other equipment	***$384 830***
Other investment costs	***$575 900***
Replenishment of capital in circulation	***$1 587 010***
TOTAL	**$17 891 908**

Project Financing Structure**

Total amount of necessary investment costs is $17,9 mln. (11,2% of own capital (in form of know-how) and 88,8% of investment costs); it will be used for land lot purchase, construction and repairs of necessary facilities, equipment purchase and installation, replenishment of capital in circulation and implementation of know-how in area of production of bioplastic, environmentally safe product.



***final legal structure of the enterprise and distribution of profit to be discussed in future and agreed during negotiations with investor, taking in consideration participation of each party in project implementation.*

Project Financial Efficiency Parameters
(for the period of forecast – 6 years)

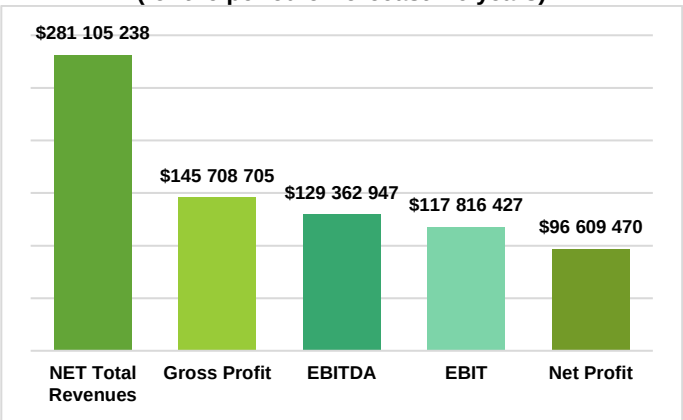
52 %	46 %	42 %	34 %
Gross Profit Margin (%)	**EBITDA Margin (%)**	**Ordinary Income Margin (%)**	**Return on Sales (%)**

Project Profitability Parameters

The project is profitable and efficient for implementation – it is evidenced not only by profitability and efficiency rates, but also by the parameters of attractiveness for investments.

Aggregate gross revenue during the period of creation and production is planned on the level of **$298 820 729,** and amount of capitalized net profit is **$96 609 470.**

Financial Results
(for the period of forecast – 6 years)



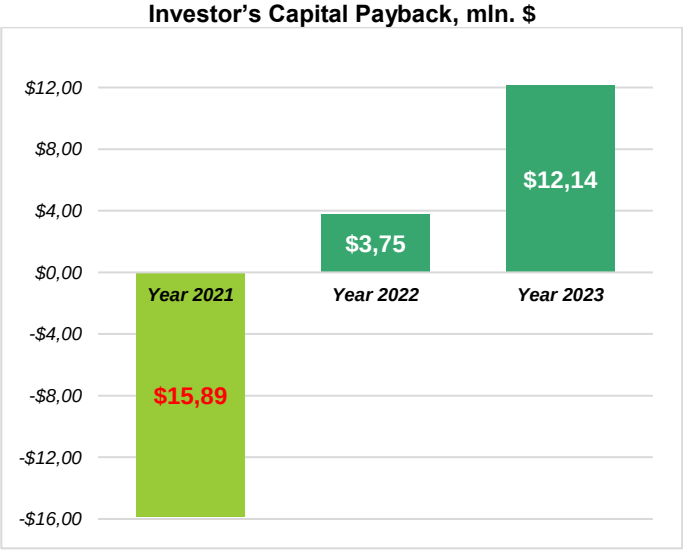
Assessment of Attractiveness for Investments

Discount rate in the project is 18%. The following parameters of project attractiveness for investments are achieved with such discount rate:

Parameter	Value
Project period, months	**72**
Payback period from the beginning of production, months	**18**
Discount payback period from the beginning of production, months	**20**
PP, Payback period, months	**30**
DPP, Discount payback period, months	**32**
NPV, Net present project value, USD	**$42 528 813**
IRR, Internal rate of return, %	**87,8%**
PI, Profitability index, points	**3,61**
ROS, Return on sales, %	**34,4%**
ROI, Return on investment, %	**540%**

Project efficiency parameters demonstrate the intrinsic "reserve of financial strength" of the project that guarantees return of investment capital in full amount, in time due, and receipt of high level of profit from implementation of this investment project.

Investor's Capital Payback, mln. $



**current calculation based on latest starch equipment proposals and could be corrected within engineering project*